

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-204549

(43)Date of publication of application : 19.07.2002

(51)Int.Cl.

H02K 5/22

H02K 3/38

(21)Application number : 2001-325845

(71)Applicant : FANUC LTD

(22)Date of filing : 24.10.2001

(72)Inventor : KATSUSAWA YUKIO
MAEDA YOSHINOBU
UEMURA MORIHEI
YOSHIMURA KAZUTAKA

(30)Priority

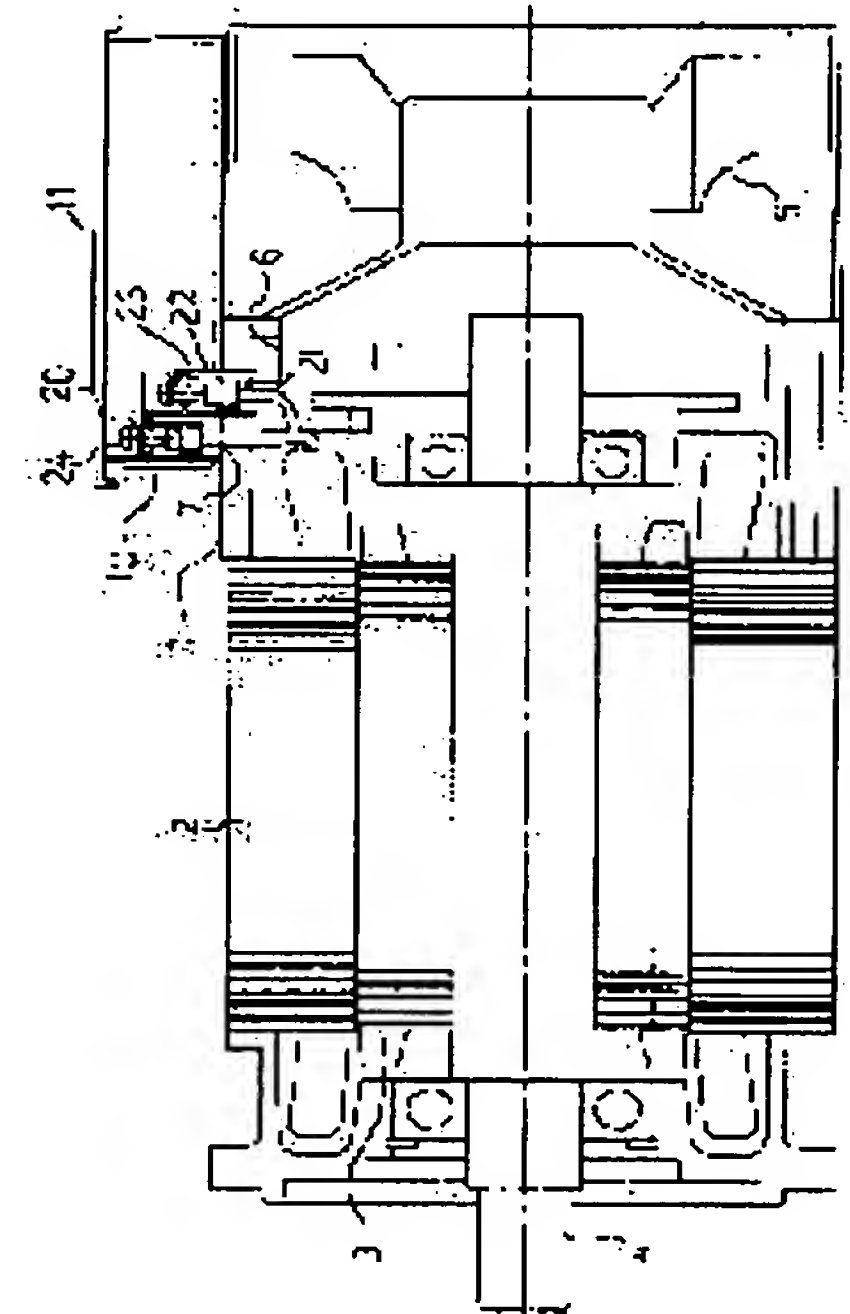
Priority number : 2000326579 Priority date : 26.10.2000 Priority country : JP

(54) TERMINAL BOARD OF MOTOR

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a compact terminal board which can easily change windings and can improve the rate of automatization of assembling and inspection processes.

SOLUTION: The terminal board 20 is mounted to a hole 6 for terminal block of a housing 1 of a motor. A lead-out wire 7 of a stator winding is pressure contacted to a pressure contact portion 22 of a lead-out terminal 21. A conductive plate 23 of the lead-out terminal 21 is bent and inserted to the lower side of a screw 24 of a power supply terminal of the terminal board 20. The tip of a power supply cable is inserted in between the screw 24 and conductive plate 23 and screwed to connect the power supply cable and the winding. Since the lead-out wire 7 is connected to the terminal at the lower side of the terminal board 20 and does not appear in a space within a terminal box 10, the space which the power supply cable can occupy becomes large and therefore the connection to the terminal is facilitated. Accordingly, the change of windings such as delta and star connections can be facilitated. Since the lead-out wire 7 is mounted to the terminal board 20 and its position and attitude are also fixed, the inspection of the winding can be made easily at assembling.



LEGAL STATUS

[Date of request for examination] 24.10.2001

[Date of sending the examiner's decision of rejection] 02.11.2004

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

*** NOTICES ***

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] It is fixed near the periphery section of the hole dug by housing of a motor, or this hole. It is the terminal block of the motor for connecting the power cable which supplies the electrical and electric equipment from the exterior of this motor, and the lead wire of the stator winding of this motor. This terminal block It is the terminal block of the motor which the power supply terminal section which connects said power cable to a top face, and the lead-wire connection which connects said lead wire to the lower part are prepared, and is characterized by connecting said power supply terminal section and said lead-wire connection with the conductor.

[Claim 2] It is the terminal block according to claim 1 which said lead wire is connected with the terminal-block down side, and is constituted so that a power cable may be connected in said power supply terminal section in the top-face location of a terminal block.

[Claim 3] It is the terminal block according to claim 2 which said lead wire is connected with said lead-wire connection with the posture of the sense direction of a hole, and the direction of abbreviation identitas which picks out this lead wire from said housing, and is constituted so that said cable may be connected in said power supply terminal section on the clamp face of said housing of said terminal block, and the field of abbreviation concurrency.

[Claim 4] It is fixed near the periphery section of the hole dug by housing of a motor, or this hole. It is the terminal block of the motor for connecting the power cable which supplies the electrical and electric equipment from the exterior of this motor, and the lead wire of the stator winding of this motor. To this terminal block It is the terminal block of the motor with which the interference terminal area which connects said lead wire with the power supply terminal section which connects said power cable fixes, the sticking-by-pressure section and a current carrying part are constituted by one, and this interference terminal area is characterized by for this sticking-by-pressure section sticking said lead wire by pressure, and connecting said current carrying part to said power supply terminal section.

[Claim 5] It is the terminal block of the motor according to claim 4 with which said power supply terminal section is equipped with a screw terminal, the shape of a hand of a hook is attached in nothing and said lead wire from the lower part of said sticking-by-pressure section, and said interference terminal area is characterized by wearing in the screw section of said screw terminal in between horizontally [the plate-like part of said current carrying part], and being carried out.

[Claim 6] It is fixed near the periphery section of the hole dug by housing of a motor, or this hole. It is the terminal block of the motor for connecting the power cable which supplies the electrical and electric equipment from the exterior of this motor, and the lead wire of the stator winding of this motor. To this terminal block It is the terminal block of the motor which has the applied part which carries out fitting immobilization of the interference terminal area, and is characterized by the configuration, now being by the sticking-by-pressure section which an interference terminal area sticks said lead wire by pressure with the power supply terminal section which connects said power cable, and is connected, and the current carrying part which connects this power supply terminal section and the sticking-by-pressure section.

[Claim 7] It is the terminal block of claim 4 equipped with the wall which said sticking-by-pressure section is formed in the shape of tubing, lead wire is inserted in this tubing, sticking-by-pressure connection of the caulking ***** is made, and the plate-like part of said current carrying part contacts the tip of the lead wire inserted in said sticking-by-pressure section between the points linked to said sticking-by-pressure section and said power supply terminal section, and prevents the migration, and a motor according to claim 5 or 6.

[Claim 8] Said wall is the terminal block of the motor according to claim 7 which bends the plate-like part

of said current carrying part, and is formed.

[Claim 9] Said wall is the terminal block of the motor according to claim 7 currently formed by adding another member to the plate-like part of said current carrying part.

[Claim 10] Claim 7 which prepares a clearance between said sticking-by-pressure section end faces and said walls, and enabled it to check lead wire from this clearance, the terminal block of a motor according to claim 8 or 9.

[Claim 11] The terminal block of the motor according to claim 5 or 6 with which it considers as tubing with which the tip of said sticking-by-pressure section was closed, and the view port which can supervise lead wire is formed in the side face of this sticking-by-pressure section.

[Claim 12] It is the terminal block of the motor according to claim 4 characterized by equipping said interference terminal area with the shape of a straight line, equipping nothing and said power supply terminal section with a screw terminal, attaching said lead wire from the lower part of said interference terminal area, and equipping said screw terminal with that of said current carrying part from the lower part.

[Claim 13] The terminal block of the motor according to claim 12 characterized by connecting said current carrying part to said power supply terminal section by the screw section fixing to said current carrying part, and concluding a screw in this screw section.

[Claim 14] Said terminal block is a terminal block of the motor of 13 claim 1 positioned in the edge of a terminal box right above the hole which takes out said lead wire dug by housing of a motor thru/or given in inner 1 term.

[Translation done.]

*** NOTICES ***

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the terminal block which makes connection between the stator winding of a motor, and an external power cable especially about a motor.

[0002]

[Description of the Prior Art] Drawing 12 is drawing showing the structure of the conventional terminal block attached in housing of a motor, and shows the sectional view cut along with the center line of a motor shaft. This operation gestalt shows the example applied to the motor for a main shaft drive of a machine tool. In drawing 12, a sign 1 is housing of a motor and, as for 2, a stator and 3 are fans to whom Rota and 4 cool a rotor shaft and 5 cools a motor. The hole 9 for lead wire for pulling out the lead wire 7 of each phase winding of a stator 2 out of housing 1 is formed in housing 1. The terminal box 10 equipped with the terminal block 80 in one is attached in housing 1, the lead wire 7 of each phase picked out from said hole 9 for lead wire is led in this terminal box, and that tip is connected to the electric conduction plate 81 by the solderless terminal 83 of a terminal block 80.

[0003] Drawing 13 is drawing which saw the terminal block 80 in this terminal box 10 from the upper part, and the tip of the lead wire 7, 7, and 7 of each stator winding is electrically connected to each electric conduction plates 81, 81, and 81 by the screws 82, 82, and 82 of the solderless terminals 83, 83, and 83 prepared in the terminal block 80. Moreover, the solderless terminals 84, 84, and 84 which connect power cables 70, 70, and 70 to the other end of each electric conduction plates 81, 81, and 81 are formed, and the power cables 70, 70, and 70 of each phase are connected to each electric conduction plates 81, 81, and 81 by the screw 82 of a solderless terminal, respectively. Drawing 13 shows the example of connection of three terminals.

[0004] As mentioned above, a conventional terminal block 80 and a conventional terminal box 10 really attach a terminal block 80 in shaping or a terminal box 10, and make it integral construction. And in order to manufacture a motor, this terminal box 10, the stator 2 which constitutes a motor, Rota 3, a fan motor, etc. are manufactured at a respectively different process in advance, and are together put at the final-assembly process. In this final-assembly process, lead wire 7 was introduced from the hole 9 for lead wire of housing 1, this lead wire is attached to the hole of a terminal box 10, and the terminal box 10 is attached to housing 1 with through. And after attaching a terminal box 10, with the screw 82 of a solderless terminal 83, the screw bundle of the tip of lead wire 7 was carried out by the help at the current carrying part 81 of a terminal block 80, and it has connected electrically.

[0005]

[Problem(s) to be Solved by the Invention] The method of acquiring the optimal rate property required of a motor and a torque characteristic is adopted by performing the coil change-over for changing to a star or a delta connection to one of the effective approaches of raising the output specification of a motor. In this case, although three terminals needed to be used as six terminals and the coil change-over needed to be performed, in order to have made it six terminals, the terminal block in a terminal box had to be made into twice as many magnitude as this, and the approach only had also enlarging magnitude of the terminal box itself. Now, it is contrary to space-saving-izing and saving-resources-ization. In the industry of a machine tool etc., space-saving-izing of a machine and saving-resources-ization are made into the trend of ED, and it is contrary also to this trend.

[0006] Moreover, if the diameter of a cable by the side of a power source is especially enlarged for the correspondence to the overseas safety standard, or a cost cut, the bend radii of a cable became large and the case where it is difficult to connect a power cable to a terminal block within the conventional terminal box

has arisen.

[0007] Furthermore, as a problem from a manufacturer side, as mentioned above, connection with the terminal block of lead wire is made by the help. As for the activity of automatic and hand control being intermingled in assembly Rhine, it is desirable preferably on effectiveness and insurance to enable it to automate all. Furthermore, since lead wire is supple and is crooked, the posture is indefinite, and it is difficult to decide a location and a posture. Therefore, it is difficult to carry out a screw bundle to a terminal block automatically. Moreover, though it is made to inspect a coil automatically from the ability not to decide this location posture, it is difficult to contact contact etc. to lead wire, and it difficult to also automate inspection of a coil. These matters become a factor and the erector of a motor has become the hindrance of the whole automation promotion.

[0008] Then, it is in this invention offering the terminal block which can acquire two or more output specifications which are the motors of the former and the same size and are depended on a coil change-over etc. by improving the terminal block which makes connection between a power cable and lead wire, and can gather the rate of automation of an assembly-inspection process.

[0009]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, it is fixed near the periphery section of the hole dug by housing of a motor, or this hole. In the terminal block of the motor for connecting the power cable which supplies the electrical and electric equipment from the exterior of this motor, and the lead wire of the stator winding of this motor, invention concerning claim 1 By preparing the power supply terminal section which connects said power cable to a terminal block on the top face, and the lead-wire connection which connects said lead wire to the lower part, and connecting said power supply terminal section and said lead-wire connection with a conductor Field space in the terminal box which prevents that lead wire is in a terminal box, and can occupy a power cable was enlarged.

[0010] Furthermore, invention concerning claim 2 prepared said terminal block in the output port location which takes out said lead wire, said lead wire was connected with the terminal-block down side, and the power cable was constituted so that it might connect in said power supply terminal section of the top-face location of a terminal block. Moreover, invention concerning claim 3 is constituted so that said lead wire may be connected with said lead-wire connection with the posture of the sense direction of a hole, and the direction of abbreviation identitas which picks out this lead wire from said housing and said cable may be connected with said power supply terminal section on the clamp face of said housing of said terminal block, and the field of abbreviation concurrency.

[0011] Moreover, invention concerning claim 4 fixed the interference terminal area which connects said lead wire with the power supply terminal section which connects said power cable to this terminal block, this interference terminal area constitutes the sticking-by-pressure section and a current carrying part in one, this sticking-by-pressure section sticks said lead wire by pressure, and the current carrying part was connected to said power supply terminal section. And in invention concerning claim 5, said lead wire was attached from the lower part of said sticking-by-pressure section, and the plate-like part of said current carrying part wears in between, and was made for said power supply terminal section to be equipped with a screw terminal, to make said interference terminal area into the shape of a hand of a hook, and to be made horizontal to the screw section of said screw terminal.

[0012] Moreover, invention concerning claim 6 is constituted from the power supply terminal section which connects a power cable for an interference terminal area, the sticking-by-pressure section which sticks said lead wire by pressure and is connected, and a current carrying part which connects this power supply terminal section and the sticking-by-pressure section, and equipped this terminal block with the applied part which carries out fitting immobilization of this interference terminal area.

[0013] Invention concerning claim 7 forms the sticking-by-pressure section of the interference terminal area mentioned above in the shape of tubing, lead wire is inserted in this tubing, and it was made to make sticking-by-pressure connection of the caulking *****, and the plate-like part of a current carrying part contacts the tip of the lead wire inserted in said sticking-by-pressure section between the points linked to the sticking-by-pressure section and the power supply terminal section, and was equipped with the wall which prevents the migration. And invention concerning claim 8 for this wall bent and formed the plate-like part of said current carrying part, and invention concerning claim 9 was formed by adding another member to the plate-like part of a current carrying part. Moreover, invention concerning claim 10 prepares a clearance between said sticking-by-pressure section end faces and said walls, and enabled it to check lead wire from this clearance. Invention concerning claim 11 considered as tubing with which the tip of the sticking-by-pressure section was closed, and the view port which can supervise lead wire formed it in the

side face of this sticking-by-pressure section.

[0014] Furthermore, invention concerning claim 12 prepares the shape of a straight line for said interference terminal area in nothing and said power supply terminal section, said lead wire attaches a screw terminal from the lower part of said interference terminal area, it is equipped with the plate-like part of said current carrying part from the lower part of said screw terminal, and it is constituted by appropriation.

[0015] The screw section fixes invention concerning claim 13 to said current carrying part, and said current carrying part is made to be connected by concluding a screw in this screw section to said power supply terminal section. Moreover, in invention concerning claim 14, said terminal block is characterized by being positioned in the edge of a terminal box right above the hole which takes out said lead wire dug by housing of a motor.

[0016]

[Embodiment of the Invention] Drawing 1 is drawing explaining the condition when attaching the terminal block of 1 operation gestalt of this invention in a motor, and shows the sectional view cut along with the center line of a motor shaft. Moreover, drawing 2 is drawing which saw the terminal block 20 in this terminal box 10 from the upper part.

[0017] In drawing 1, the same sign is given to the same member as the conventional example shown by drawing 12. 1 is housing of a motor and 2 is a stator and a fan to whom Rota and 4 cool a rotor shaft and, as for 3, 5 cools a motor. The hole 6 for terminal block for equipping with the terminal block which connects the lead wire 7 and the external power cable 70 of each phase winding of a stator 2 to housing 1 is formed. The terminal block 20 is being fixed to the housing 1 of a motor by the means for detachable (not shown) of a stop screw etc. in the part of this hole 6 for terminal block. the operation gestalt shown in this drawing 1 and drawing 2 -- ** from drawing 2 -- as if -- the terminal block 20 consists of six terminals. Six terminal areas are formed in a terminal block 20, this each terminal area is equipped with the interference terminal area 21, and the screw 24 which constitutes the terminal area, the interference terminal area, and the power supply terminal section mentioned later of this terminal block 20 constitutes each terminal. Electric conduction Itabe 23 who is the sticking-by-pressure section 22 which makes sticking-by-pressure connection of the lead wire 7 which constitutes a lead-wire connection, and a current carrying part which aims at connection with a cable through the power supply terminal section is united, and each interference terminal area 21 is constituted. Six interference terminal areas 21 and six screws 24 are attached in six terminal areas of a terminal block 20, and the terminal block 20 which has six terminals consists of the 1st operation gestalt shown by this drawing 1 and drawing 2.

[0018] the tip carries out a pressure welding to the lead wire 7 of each coil by the sticking-by-pressure section 22 of each interference terminal area 21 -- having -- the interference terminal area 21 -- it connects, respectively. The other end of the sticking-by-pressure section 22 of each interference terminal area 21 and electric conduction Itabe 23 formed in one is connected with the external power cable 70 by the screw 24 which constitutes the power supply terminal section. The sticking-by-pressure section 22 which constitutes a lead-wire connection is the lower part of this interference terminal area 21, it is constituted so that lead wire 7 may be fitted in and stuck to the sticking-by-pressure section 22 by pressure towards the upper part from a lower part, and electric conduction Itabe 23 is constituted so that it can connect with a power cable 70 in the top-face location of a top face 20, i.e., a terminal block. Moreover, a sign 10 is a terminal box, and it is arranged so that a terminal block 20 may be located in the end of this terminal box 10, as a terminal block 20 is covered. In addition, a sign 11 is the lid of a terminal box 10.

[0019] Moreover, as shown in drawing 2, the power supply terminal section which connects a power cable 70 was constituted with the level difference, each stage was equipped with three terminal areas, and the terminal block 20 is equipped with a total of six terminals by attaching the interference terminal area 21 and a screw 24 in this, respectively. The tip of each power cable 70 is bound tight with the screw 24 of the power supply terminal section by electric conduction Itabe 23, each interference terminal area 21, and pressure-welding connection is made. And the terminal block 20 is arranged at the end section of a terminal box 10. That is, the terminal box 10 is attached in housing 1 so that the terminal block 20 attached in the hole 6 for terminal block of the housing 1 of a motor may come to the end section of a terminal box. Since space is inclined and formed in a terminal box 10 from this and a power cable 70 can be bent with big radius of curvature by this space, the big power cable 70 of a path is also easily connectable with a terminal block 20. Drawing 3 is an example in the case of being several 3 of the terminal of a terminal block, and is drawing which saw the terminal block in a terminal box from the upper part like drawing 2.

[0020] Drawing 4 is the explanatory view of the interference terminal area 21 which forms the connection terminal in this operation gestalt, and, for drawing 4 (a), the front view and drawing 4 (b) are [a bottom

view and drawing 4 R> 4 (d) of a plan and drawing 4 (c)] right side views. This interference terminal area 21 is formed in the shape of [of a hook] a hand with a conductor, and the sticking-by-pressure section 22 which inserts and sticks lead wire 7 to the lower part by pressure is formed in the shape of tubing. Electric conduction Itabe 23 is formed united with this sticking-by-pressure section 22, this electric conduction Itabe 23 is bent 90 abbreviation, and a tip is formed in two forks, and it is formed so that the shank of a screw 24 may be inserted between these two forks. namely, the field of the point formed in electric conduction Itabe's 23 two forks -- the direction of the lead-wire 7 insertion hole of the sticking-by-pressure section 22 -- receiving -- abbreviation -- the perpendicular field is formed. The part of this electric conduction Itabe 23 that was bent and was formed in two forks forms the power supply terminal section with a screw 24.

[0021] Drawing 5 is drawing explaining installation of terminal-block - of this interference terminal area 21. In drawing 5 , the front view of a terminal area with which the plan (b) of the installation actuation explanation to the terminal block of the interference terminal area 21 attaches the interference terminal area 21 of the terminal block as which it regarded from the side elevation of this explanation of operation and the path of insertion of (c) interference terminal area 21 in (a), and (d) are a plan in the condition of having attached the interference terminal area 21 in the terminal block, and a side elevation in the condition of having attached (e) interference terminal area 21 in the terminal block.

[0022] In the terminal area of a terminal block 20, as shown in drawing 5 (b), (c), and (e), the nut 25 has fixed by heat joining etc. The screw 24 is screwing in this nut 25. this terminal area -- both sides -- the two forks of electric conduction Itabe 23, the interference terminal area 21, -- the slot 26 which guides the point of a ** is formed.

[0023] then, after making the tip of lead wire 7 insert and stick by pressure into tubing of the sticking-by-pressure section 22 of the interference terminal area 21, screwing to the nut 25 of a screw 24 is loosened, a gap is made between a nut 25 and a screw 24, and it is shown in drawing 5 (a) and (b) -- as -- electric conduction Itabe's 23 two forks -- it inserts so that the shank of the point of a ** of a screw 24 may be pinched. this time -- electric conduction Itabe's 23 two forks -- the point of a ** is guided to said slot 26, and is shown in drawing 5 (d) and (e) -- as -- electric conduction Itabe's 23 two forks -- the point of a ** is positioned in the lower part of a screw 24. and this electric conduction Itabe's 23 two forks -- the end of a power cable 70 is inserted between the point of a **, and a screw, a screw 24 is bolted, and electric conduction Itabe 23 is electrically connected with a power cable 70. By this, a power cable 70 and a stator winding will be electrically connected through the interference terminal area 21.

[0024] Next, the terminal block to a motor and installation of a terminal box are explained. First, the lead wire 7 of each coil is picked out from the hole 6 for terminal block of the housing 1 of a motor, the tip of each lead wire 7 is inserted and stuck by pressure into tubing of the sticking-by-pressure section 22 of the interference terminal area 21, and the interference terminal area 21 is attached at the tip of each lead wire 7, respectively. Moreover, a terminal block 20 is fixed in housing 1. next, two forks [in / as drawing 5 explained / electric conduction Itabe 23, the interference terminal area 21,] -- the point of a ** is inserted so that the shank of a screw 24 may be pinched, a screw 24 is bolted, the interference terminal area 21 is fixed, and a terminal box 10 is fixed to housing 1 after that. At this time, a terminal box 10 is fixed to housing 1 so that a terminal block 20 may be located in the end section of a terminal box 10. Fitting of the lid 11 of a terminal box is carried out to the last, and an assembly is ended.

[0025] About coil inspection conducted at the time of this assembly operation, since the interference terminal area 21 connected to the lead wire 7 of each coil is attached in a terminal block 20 and that location is decided, the automatic check of a coil also becomes easy that what is necessary is just to make it move to the location which had contact etc. decided.

[0026] Furthermore, lead wire 7 is the location of the hole 6 for terminal block dug by housing 1, and is the posture of the direction pulled out from this housing 1, and is connected to the sticking-by-pressure section 22 of the interference terminal area 21 with the terminal-block 20 down side. Therefore, lead wire 7 does not occupy the inside of the space of a terminal box 10. On the other hand, it connects with each terminal of a terminal block 20 with the posture of the almost same direction as the field of housing 1, and each power cable 70 can occupy the inside of the space of a terminal box 20, as shown in drawing 2 and drawing 3 , it can connect with a terminal block in the space of a terminal box, without bending a power cable with small radius of curvature, and it becomes easy to connect it.

[0027] the two forks of electric conduction Itabe 23 who connects with the power supply terminal section in the 1st operation gestalt mentioned above in the upper part (upper part of the direction which inserts lead wire 7) of the sticking-by-pressure section 22 where the configuration of the interference terminal area 21 shown in drawing 4 sticks lead wire 7 by pressure with caulking etc. -- the ** point is arranged. namely, the

center line top of the hole which inserts this lead wire -- electric conduction Itabe's 23 two forks -- the ** point is arranged. therefore, electric conduction Itabe's 23 two forks which the point of this leader 7 connects to the power supply terminal section when lead wire 7 is inserted in the hole of the sticking-by-pressure section 22 -- it reaches to the ** point and the case where it becomes a failure linked to the power supply terminal section produces electric conduction Itabe 23. Possibility that this failure will occur especially that **** at the tip of lead wire 7 is inadequate becomes large. When it consists of enameled wires thick lead wire 7 and hard etc., even if it is fully cutting the point to an even length before inserting in the sticking-by-pressure section 22, while this lead wire 7 is inserted in the sticking-by-pressure section 22 and the sticking-by-pressure fixture is performing immobilization, the tip of lead wire 7 may become irregular and it becomes the failure of connection of electric conduction Itabe 23 and the power supply terminal section.

[0028] What is necessary is just to consider as interference terminal area 21' which has sticking-by-pressure section 22' which the tip as shown in drawing 6 closed, in order to avoid this problem. The tip of the lead wire 7 inserted in sticking-by-pressure section 22' is shut up by this in contact with the wall of the point of **** of closed sticking-by-pressure section 22', and the obstacle of connection with the power supply terminal section of the point of electric conduction Itabe 23' is avoided. However, it is difficult to find out the lead wire 7 with inadequate insertion in the sticking-by-pressure section as it is this configuration.

[0029] Then, the mode of the interference terminal area which can check easily it being certainly inserted in the sticking-by-pressure section, and being attached in it is shown in drawing 7, without lead wire 7 interfering with connection with the power supply terminal section. Drawing 7 (a) is the side elevation of the interference terminal area 121 of this embodiment, it is drawing showing the condition that drawing 7 (b) attached the perspective view and drawing 7 (c) attached lead wire 7, and drawing 7 (d) is that sectional view.

[0030] Although this interference terminal area 121 of the point which consists of conductors and consists of the tubing-like sticking-by-pressure section 122 which has a hole for inserting lead wire 7 and carrying out caulking sticking by pressure, and this sticking-by-pressure section 122 and tabular electric conduction Itabe 123 constituted in one is the same as that of the example shown in drawing 4, electric conduction Itabe's 123 configurations differ with this operation gestalt. two forks for electric conduction Itabe 123 to connect with the power supply terminal section -- it consists of drum section 123b which connects the sticking-by-pressure section 122 with point 123a formed in the **, and this point 123a. drum section 123b extends from the sticking-by-pressure section 122 to the path of insertion of lead wire 7, is bent 90 degrees by the end face of the sticking-by-pressure section 122, and predetermined distance detached building *****, constitutes wall 123c in which the field parallel to this end face was formed, is bent further 90 degrees, is prolonged on the path-of-insertion line of lead wire 7, and is bent further 90 degrees -- having -- two forks -- it is point 123a formed in the **.

[0031] As shown in drawing 7 (c) and (d), the tip of lead wire 7 is inserted until it makes tubing of the sticking-by-pressure section 122 penetrate and contacts wall 123c of a field parallel to the end face of the sticking-by-pressure section 122 of drum section 123b. Since a load increases to the force which it is going to insert at this time when the point of lead wire 7 contacts wall 123c of drum section 123b, it turns out that it was certainly inserted in the sticking-by-pressure section 122. Moreover, connection between lead wire 7 and the interference terminal area 121 can be checked by using the gap formed in the edge face-to-face of wall 123c and the sticking-by-pressure section 122 as 123d of view ports, and checking lead wire 7 from 123d of this *****. moreover, the two forks which lead wire 7 is prevented by wall 123c, and are connected with the power supply terminal section -- since it does not reach to the location of point 123a of a **, the failure of connection with the power supply terminal section does not become, but is easily made as for connection of this interference terminal area 121 to the power supply terminal section.

[0032] Drawing 8 is another operation gestalt of an interference terminal area, drawing 8 (a) is a side elevation and drawing 8 (b) is a front view. It is that, as for the difference with the interference terminal area 121 shown in this interference terminal area 221 and drawing 7, the configuration of drum section 223b of electric conduction Itabe 223, this interference terminal area 221, is only different. Tabular drum section 223b which extended from the sticking-by-pressure section 222 is bent 90 degrees, is formed in the end face of this sticking-by-pressure section 222, and parallel, is bent further 180 degrees, then, is bent 90 degrees, and forms the field parallel to the path-of-insertion line of lead wire 7. and it bends further 90 degrees -- having -- two forks -- ** point 223a is formed. That is, wall 223c which prevents migration of lead wire 7 consists of board thickness of a duplex. In addition, 223d of agreements is the gap formed in the edge face-to-face of wall 223c and the sticking-by-pressure section 222. An operation of this interference terminal area 221 and effectiveness are equivalent to the interference terminal area 121 shown in drawing 7.

[0033] Drawing 9 is the operation gestalt of still more nearly another interference terminal area, drawing 9 (a) is a side elevation and drawing 9 (b) is a front view. As shown in drawing 6, the tip of the hole of the sticking-by-pressure section 322 where lead wire 7 is inserted is closed, and the interference terminal area 321 of this operation gestalt constitutes wall 323c (this wall may bend and constitute electric conduction Itabe's 323 drum section 323b) which prevents migration of lead wire 7. 323d of view ports is formed in the side face of this sticking-by-pressure section 322, and it enables it to check the lead wire 7 inserted into the hole of the sticking-by-pressure section 322 from 323d of this view port. the two forks by which the interference terminal area 321 of this operation gestalt is also prevented by wall 323c, and the tip of lead wire connects it with the power supply terminal section -- it can do easily, without being interfered with connection of the power supply terminal section and the interference terminal area 321 by lead wire 7 since it does not reach to the location of point 323a of a **.

[0034] In addition, although the example of the lead-wire terminal shown in drawing 7 - drawing 9 prepared electric conduction Itabe in one the wall which prevents migration of lead wire 7 and a protrusion to electric conduction Itabe's drum section, you may make it add the wall which prevents the protrusion of this lead wire 7 to electric conduction Itabe. For example, it may be made to consider as the wall which fixes an inhibition member and prevents migration of lead wire in the example shown in drawing 4 between the sticking-by-pressure section 22 of the interference terminal 21, and electric conduction Itabe's 23 point.

[0035] Drawing 10 is an explanatory view explaining the terminal block of the 2nd operation gestalt of this invention. With this 2nd operation gestalt, the fitting hole 35 which fits in the interference terminal area 31 is formed in the terminal block 30 at each terminal area. Moreover, the current carrying part 33 which forms the connection of the sticking-by-pressure section 32 as a lead-wire connection and the power cable 70 which stick lead wire 7 by pressure and are connected is united with a conductor, and the interference terminal area 31 is formed. the sticking-by-pressure section 32 -- tubular -- the tip of lead wire 7 -- the hole of this shape of a lower part (motor housing side) to tubing -- it is formed so that it can insert inside. Moreover, as for the current carrying part 33 which forms a connection with a power cable, the female screw is formed in that core at the shaft orientations (the same direction as the direction of a medial axis of the hole of the shape of tubing of the sticking-by-pressure section 32) of this interference terminal area 31. And fitting is carried out and this current carrying part 33 is attached, as shown in the fitting hole 35 prepared in the terminal block 30 at the terminal area on the left-hand side of drawing 10. And the screw 34 which constitutes the power supply terminal section screws in said female screw 36. Thereby, the power supply terminal section is formed. The terminal area, the interference terminal area 31, and screw 34 of a terminal block 30 constitute each terminal from this 2nd operation gestalt. And by inserting the tip of a power cable 70 between the screw 34 of the power supply terminal section, and a current carrying part 33, bolting a screw, and connecting a power cable and the interference terminal area 31 electrically, it fixes and electrical installation of a coil and the power-source CAPE is performed.

[0036] Drawing 11 is the explanatory view of the terminal block of the 3rd operation gestalt of this invention. The terminal block 40 consists of this 3rd operation gestalt by carrying out fitting of the interference terminal area 41 to the fitting slot 45 established in the terminal area of a terminal block 40. Drawing 1111 (a) is drawing seen from [of the terminal area of the terminal block before fitting in the interference terminal area 41] insertion. Moreover, drawing when it is the explanatory view of the fitting actuation to the terminal area of a terminal block 40 and (b) sees the interference terminal area 41 from the upper part of a terminal block, and (c of drawing 11 (b) and (c)) are the side elevation.

[0037] The thickness of the point by which electric conduction Itabe 43, the interference terminal area 41, was bent 90 degrees is formed greatly, tap processing is made by the stiffness thick section, and the point which is different from this 3rd operation gestalt and the 1st operation gestalt mentioned above constitutes the power supply terminal section from a screw 44 screwed in this female screw. By carrying out fitting of the point by which this electric conduction Itabe 43 was bent 90 degrees to the fitting slot 45 of the terminal area of a terminal block, the interference terminal area 41 is fixed to the terminal area of a terminal block 40, and a terminal is formed.

[0038] Drawing 11 (d) is the example of another terminal in this 3rd operation gestalt. In this example, joining of the nut 55 is carried out to the point by which electric conduction Itabe 53, the interference terminal area 51, was bent 90 degrees, and the interference terminal area 51 is formed by constituting so that it may be made to screw with a screw 54. And the fitting slot on the terminal block is made to carry out fitting of the point of electric conduction Itabe 43 who has this nut 55, and a terminal block is formed.

[0039] Drawing 11 (e) is drawing showing the gestalt of another terminal in the pan in this 3rd operation gestalt. Burring 65 is made for the point of electric conduction Itabe 63, the interference terminal area 61,

instead of the nut shown by drawing 11 (d), a female screw is formed in this part 65, and this example is constituted so that it may screw with a screw 64. Moreover, it is the same as the example of other 3rd operation gestalt that fitting of this point of electric conduction Itabe 63 carried out burring 65 is carried out to the fitting slot of each terminal area of a terminal block, and it forms a terminal block in it.

[0040] In each operation gestalt explained above, the sticking-by-pressure section for connecting the lead wire of the interference terminal area which forms a terminal has the lead-wire insertion hole of the almost same direction as the direction of the hole of the hole 6 for a direction (terminal) block which picks out lead wire from housing. And the direction which intersects perpendicularly with the hole axis of this insertion hole, i.e., the terminal box clamp face of housing, and the field of abbreviation concurrency are considering as the clamp face of a power cable. Lead wire can be connected to an interference terminal area by this, without making it crooked by force or applying the force. furthermore, it crawls on a power cable along the field of housing -- making -- this field and abbreviation -- it can connect with a terminal block in respect of being the same, and a terminal block is prepared in the end of a terminal box, and further, since the connection of lead wire and an interference terminal is performed on the housing side face which is a field of the opposite side of a terminal block, in a terminal box, big free space is formed as compared with the conventional terminal box. Since a power cable can be made crooked using this big tooth space, the radius of curvature at the time of crookedness can be enlarged, and it can attach easily also by the large cable of a path. Moreover, even if it also attaches the approach of fixing a terminal block to housing of a motor in housing directly and fixes it to it with a screw etc., you may fix to housing through other members. Furthermore, a terminal block is stuffed into housing of a motor and you may make it fix on the base of a terminal box etc.

[0041]

[Effect of the Invention] A terminal block can be arranged at the end of a terminal box, and a coil change-over can be made easy also with the motor of the size same since the area which can occupy a power cable since the lead wire from a coil does not appear in the space in this terminal box becomes large as the former, and the engine-performance rise of a motor can be realized. Moreover, for a manufacturer, since the free space in a terminal box is expanded, a wiring activity becomes easy and assembly operation becomes easy. Moreover, since a lead-wire location will also be fixed, it becomes easy, and coil inspection can also promote automation and the reduction and the further cost cut of the necessary personnel of it are attained.

[Translation done.]

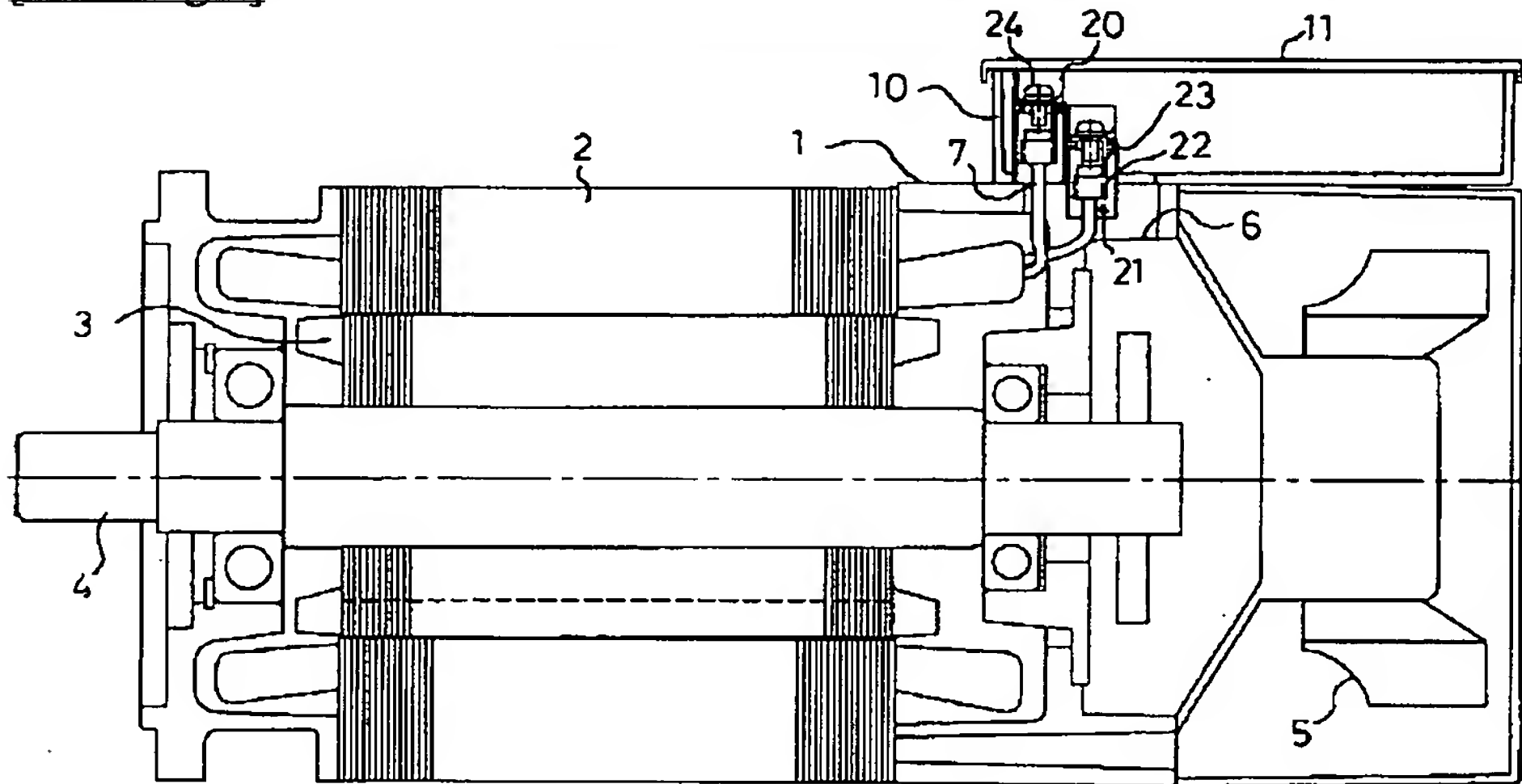
* NOTICES *

JPO and NCIPPI are not responsible for any damages caused by the use of this translation.

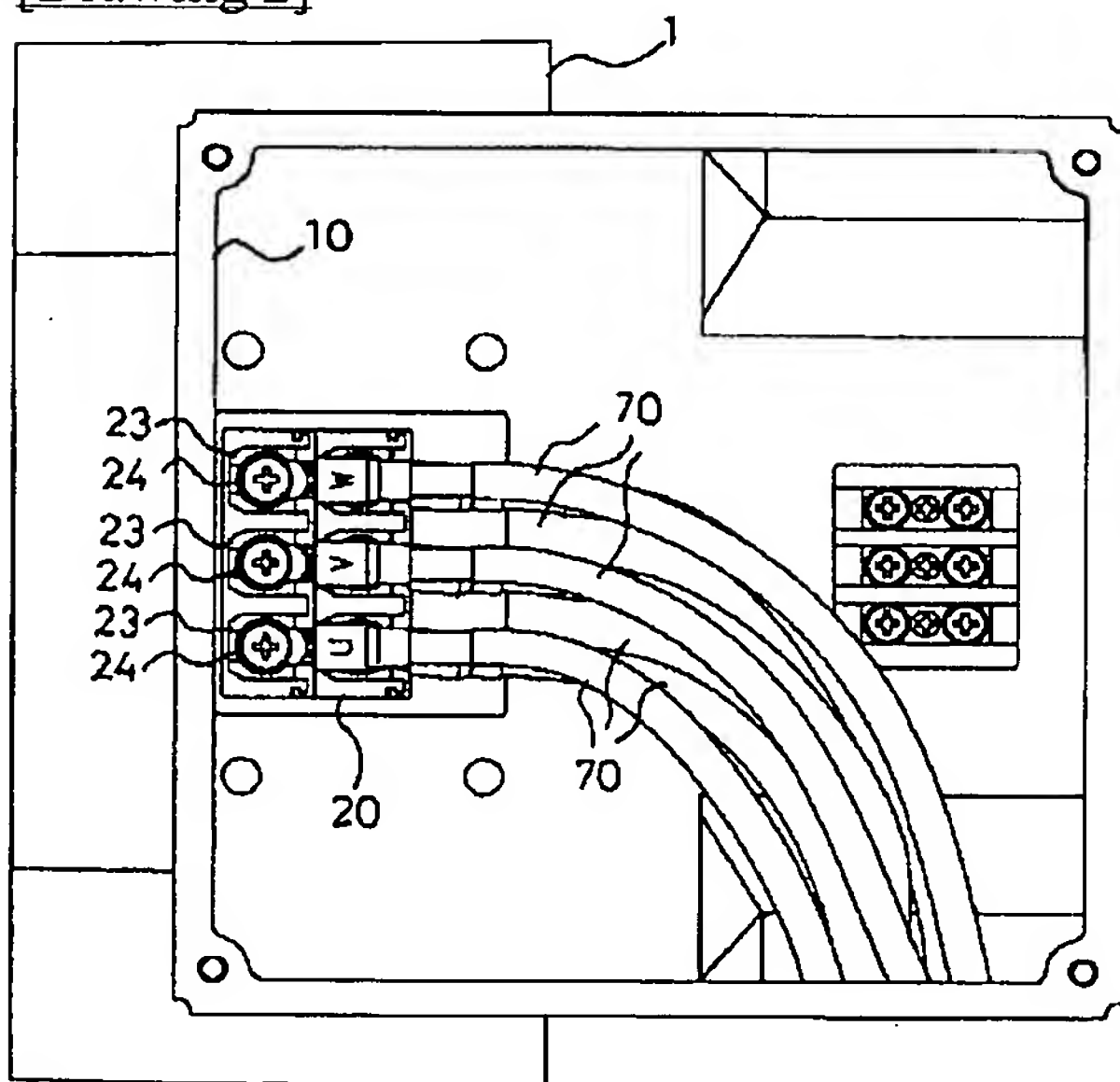
1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DRAWINGS

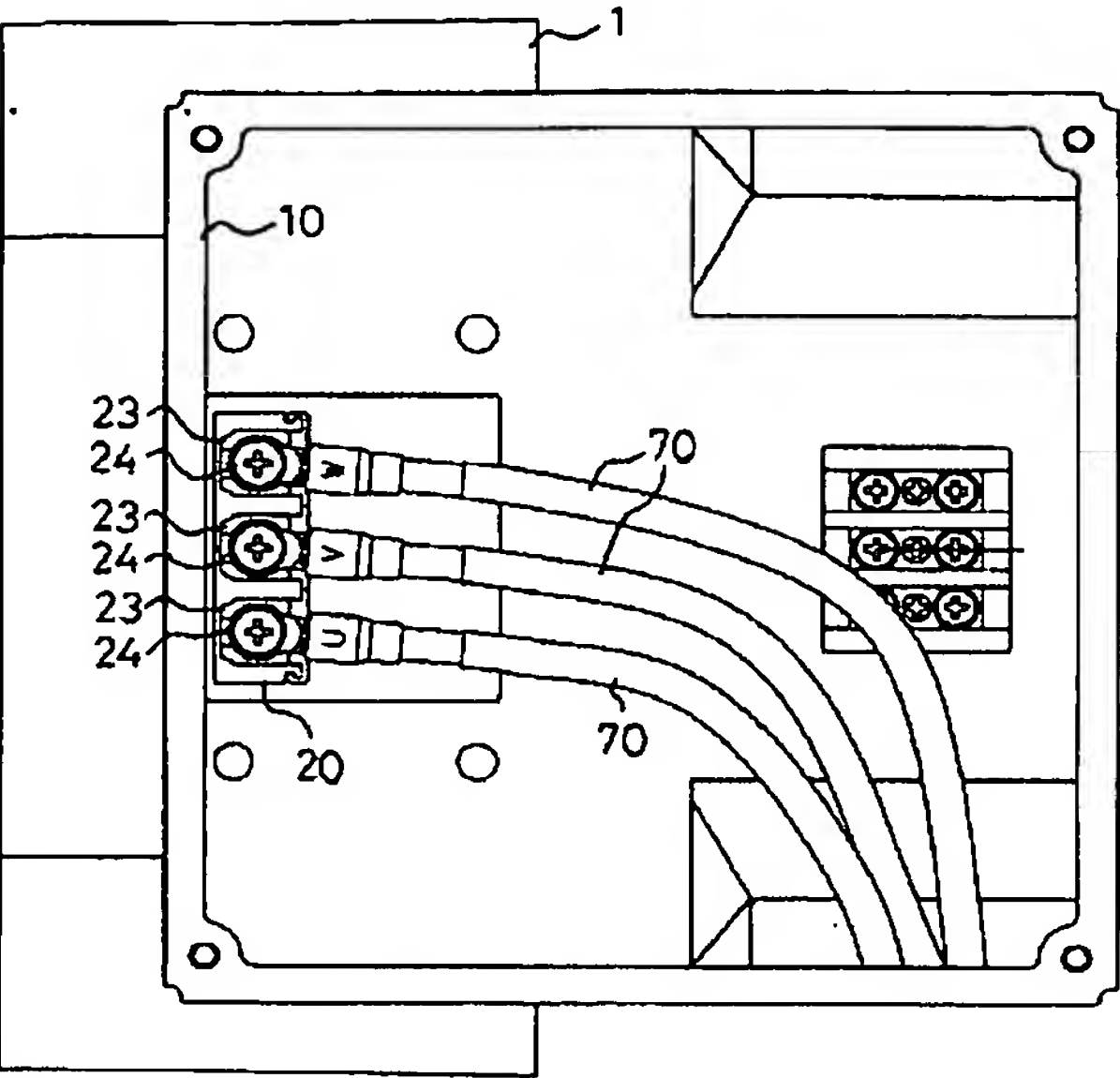
[Drawing 1]



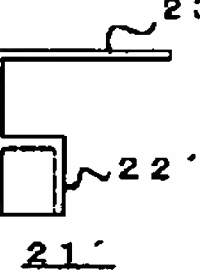
[Drawing 2]



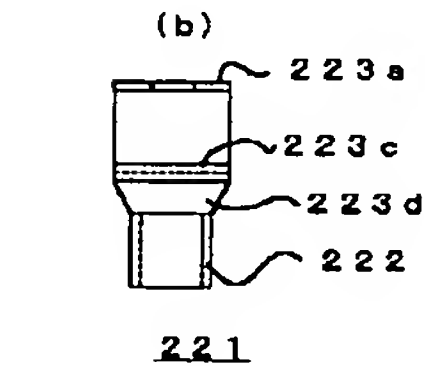
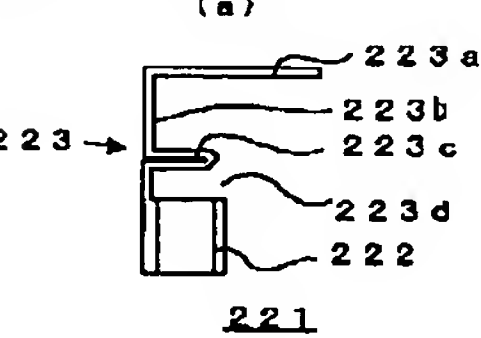
[Drawing 3]



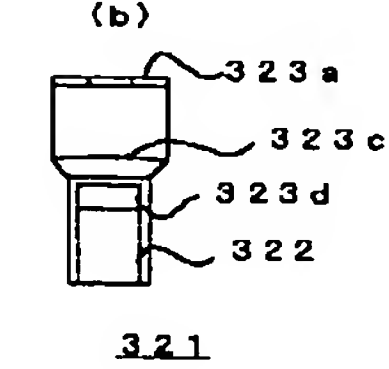
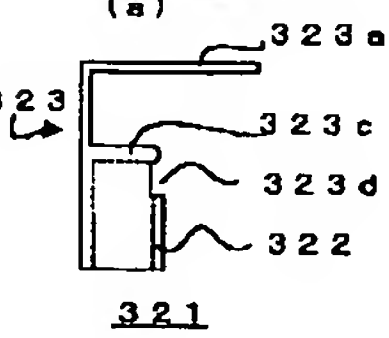
[Drawing 6]



[Drawing 8]

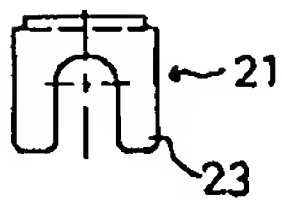


[Drawing 9]

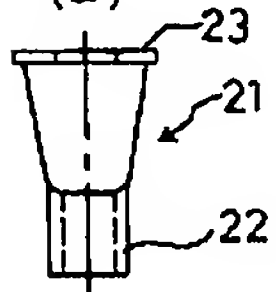


[Drawing 4]

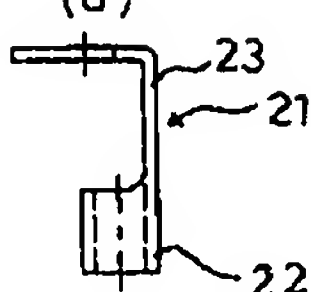
(b)



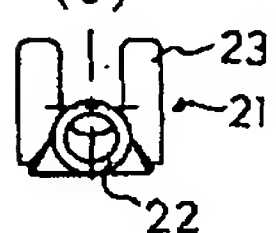
(a)



(d)

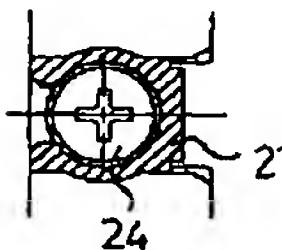


(c)

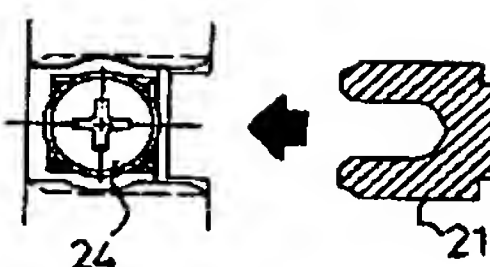


[Drawing 5]

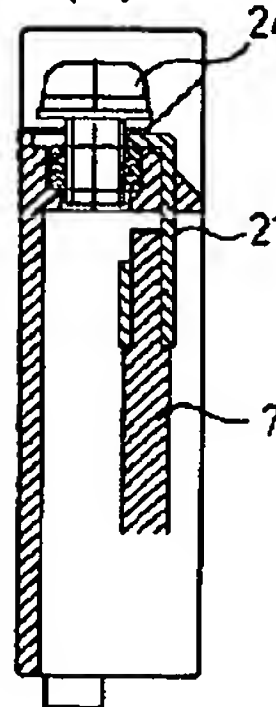
(d)



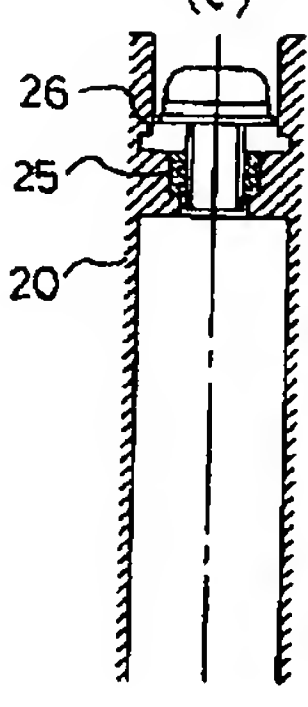
(a)



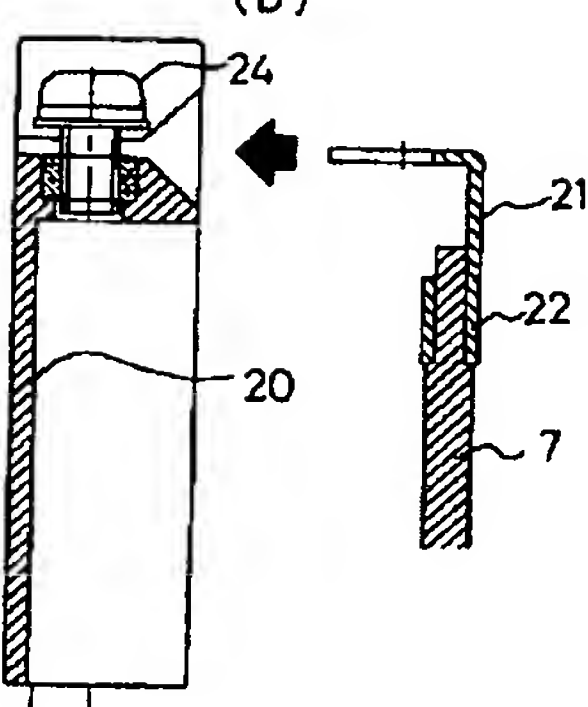
(e)



(c)

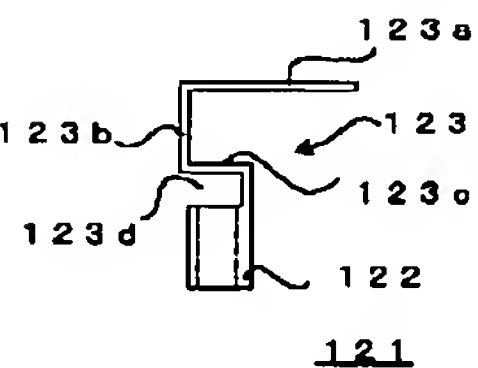


(b)

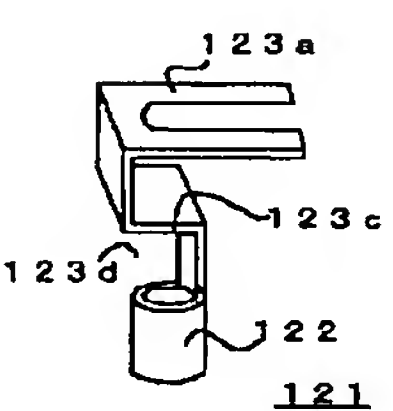


[Drawing 7]

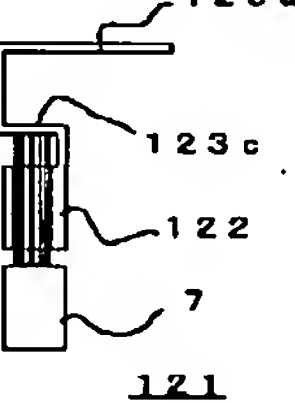
(a)



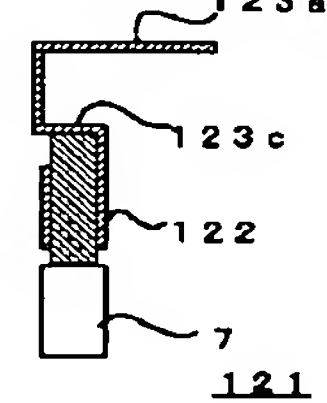
(b)



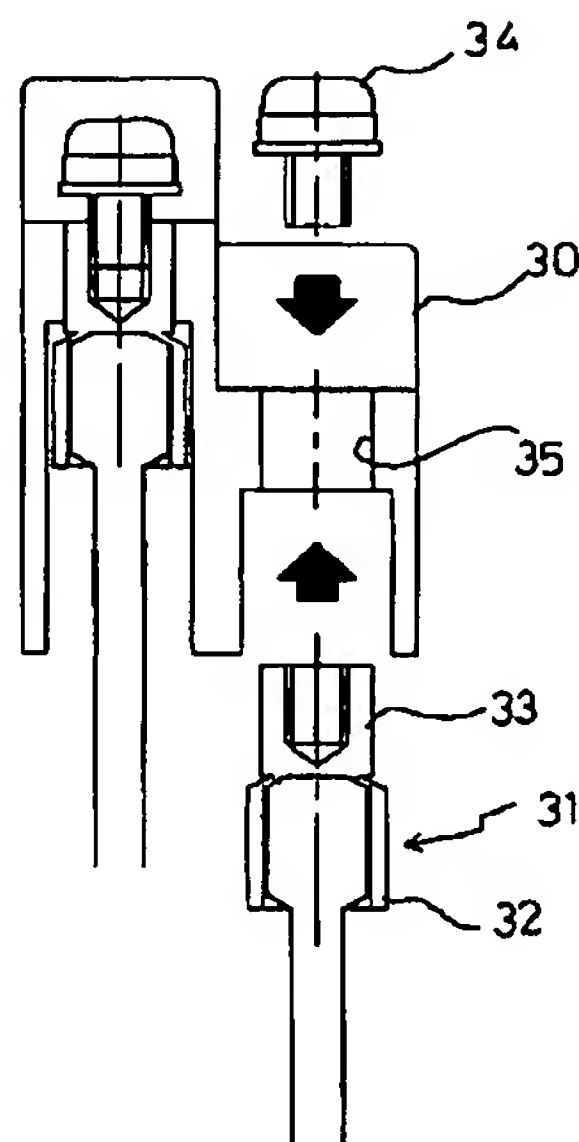
(c)



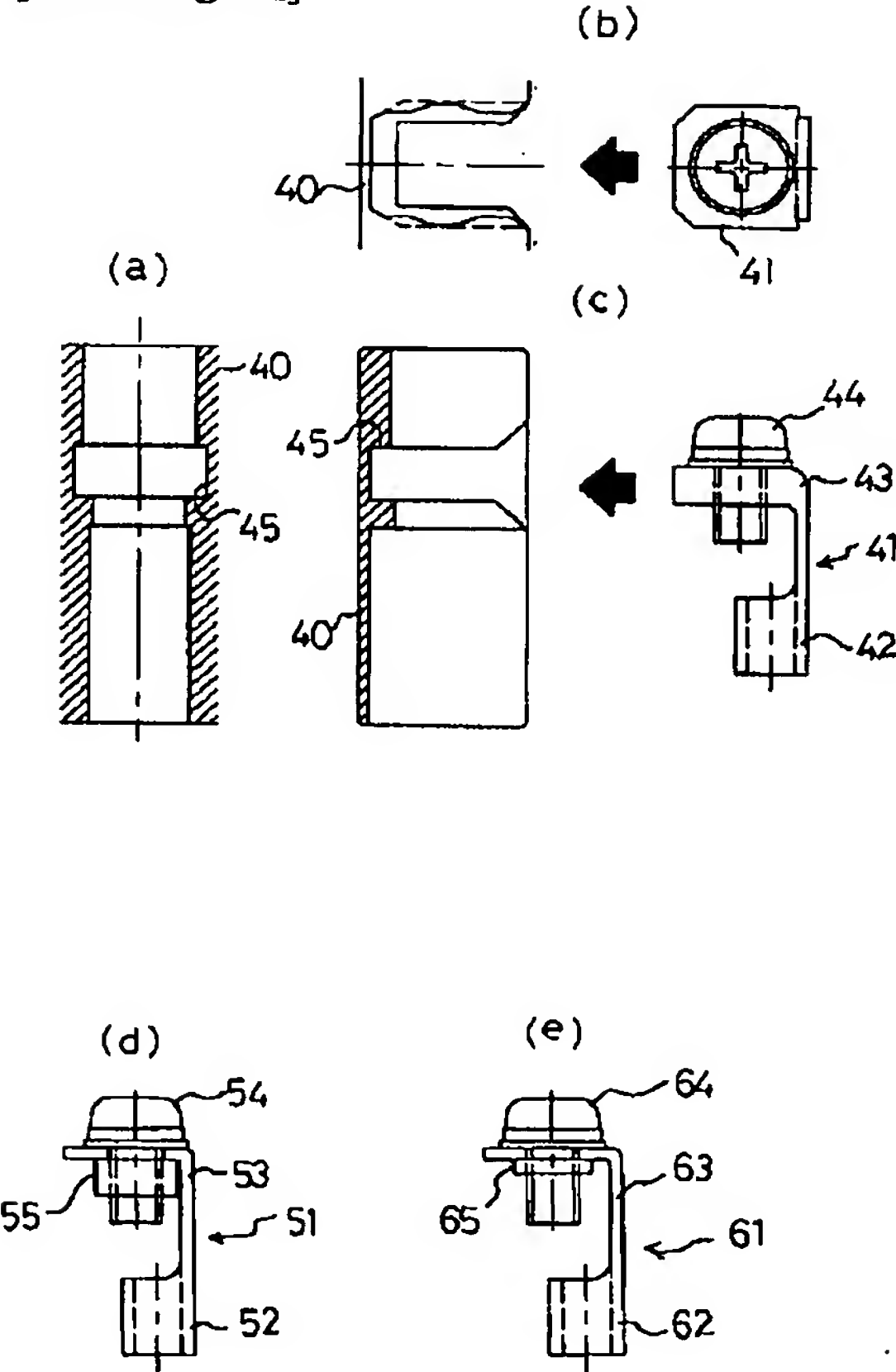
(d)



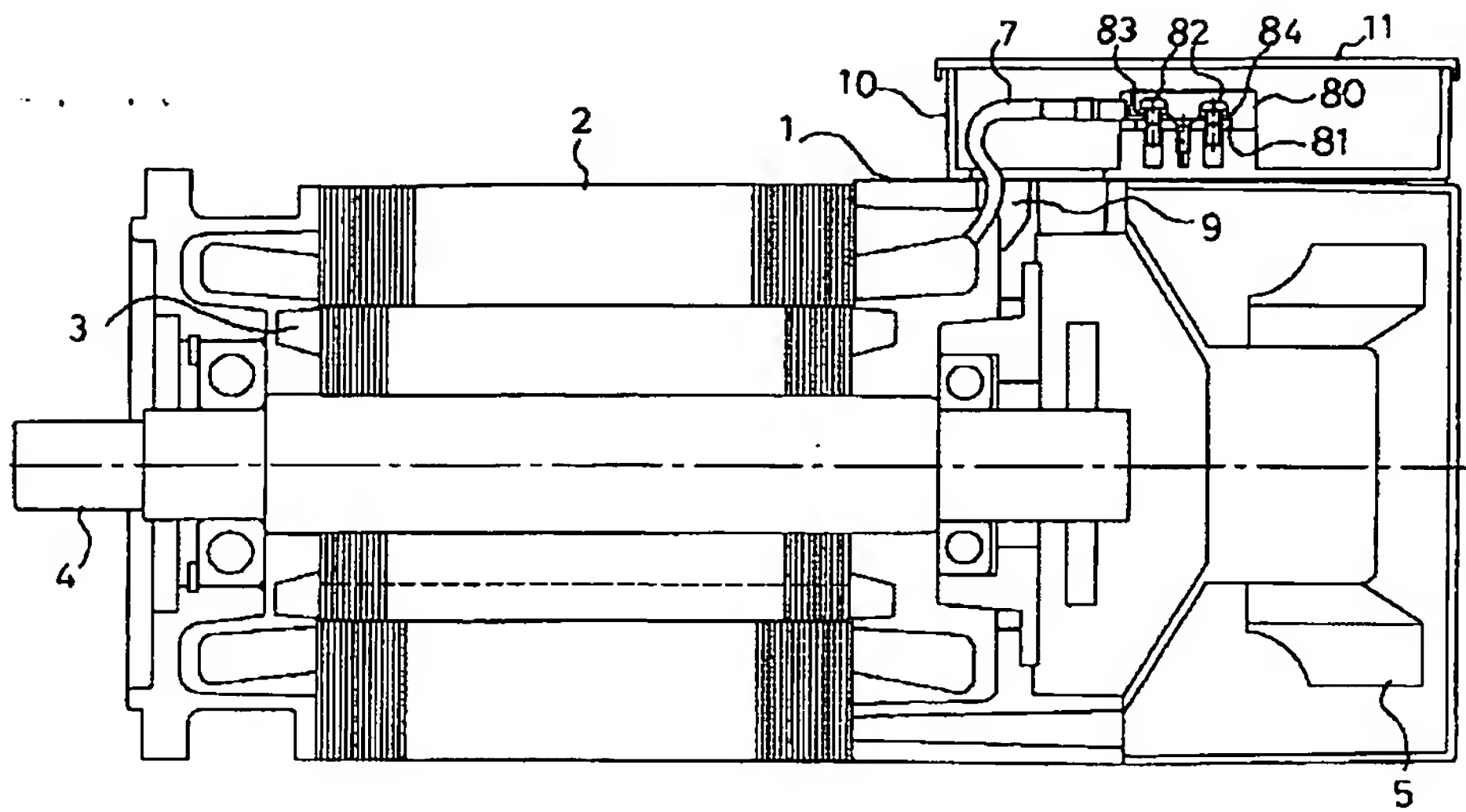
[Drawing 10]



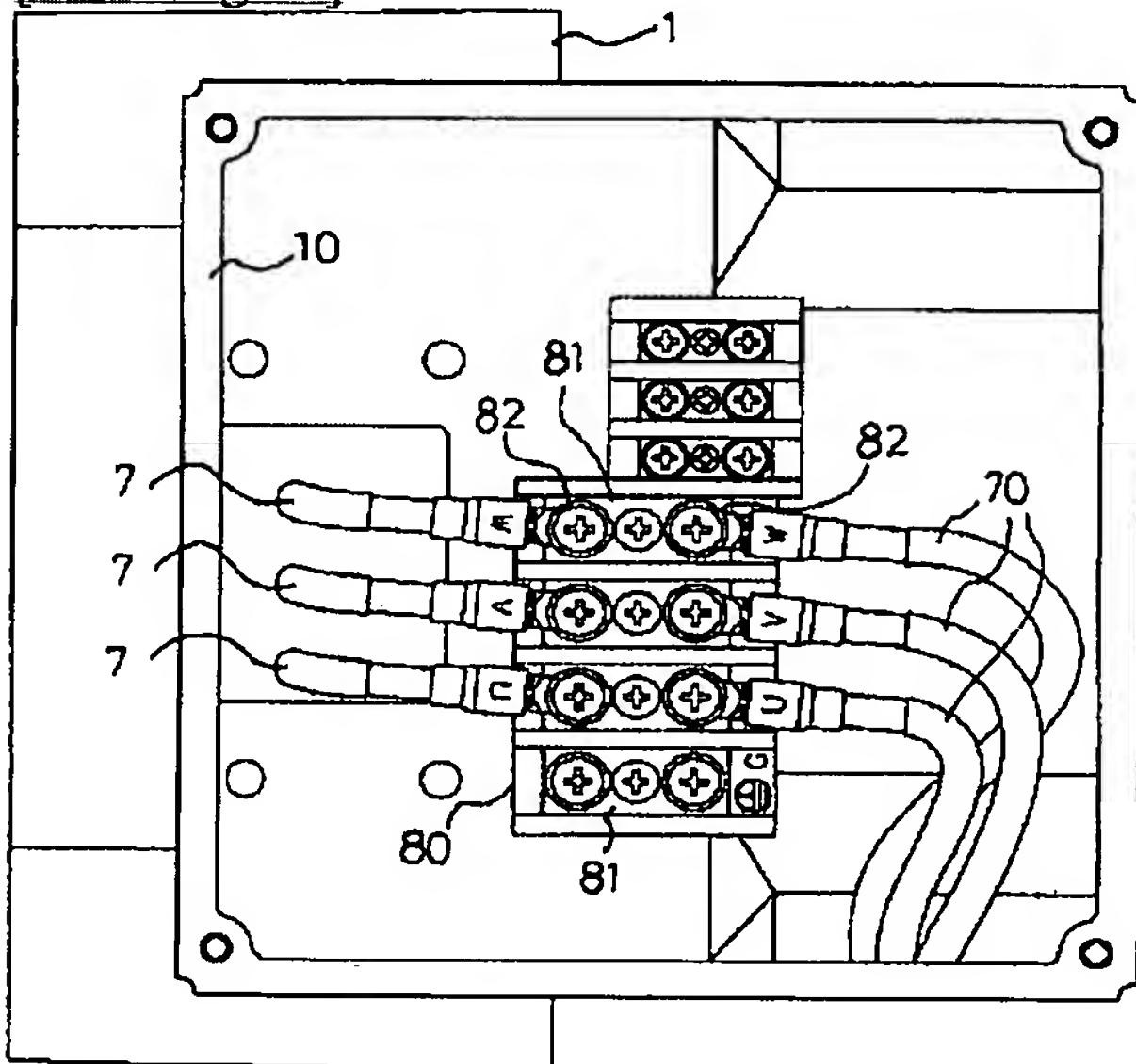
[Drawing 11]



[Drawing 12]



[Drawing 13]



[Translation done.]

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-204549

(43)Date of publication of application : 19.07.2002

(51)Int.Cl.

H02K 5/22

H02K 3/38

(21)Application number : 2001-325845

(71)Applicant : FANUC LTD

(22)Date of filing : 24.10.2001

(72)Inventor : KATSUSAWA YUKIO
MAEDA YOSHINOBU
UEMURA MORIHEI
YOSHIMURA KAZUTAKA

(30)Priority

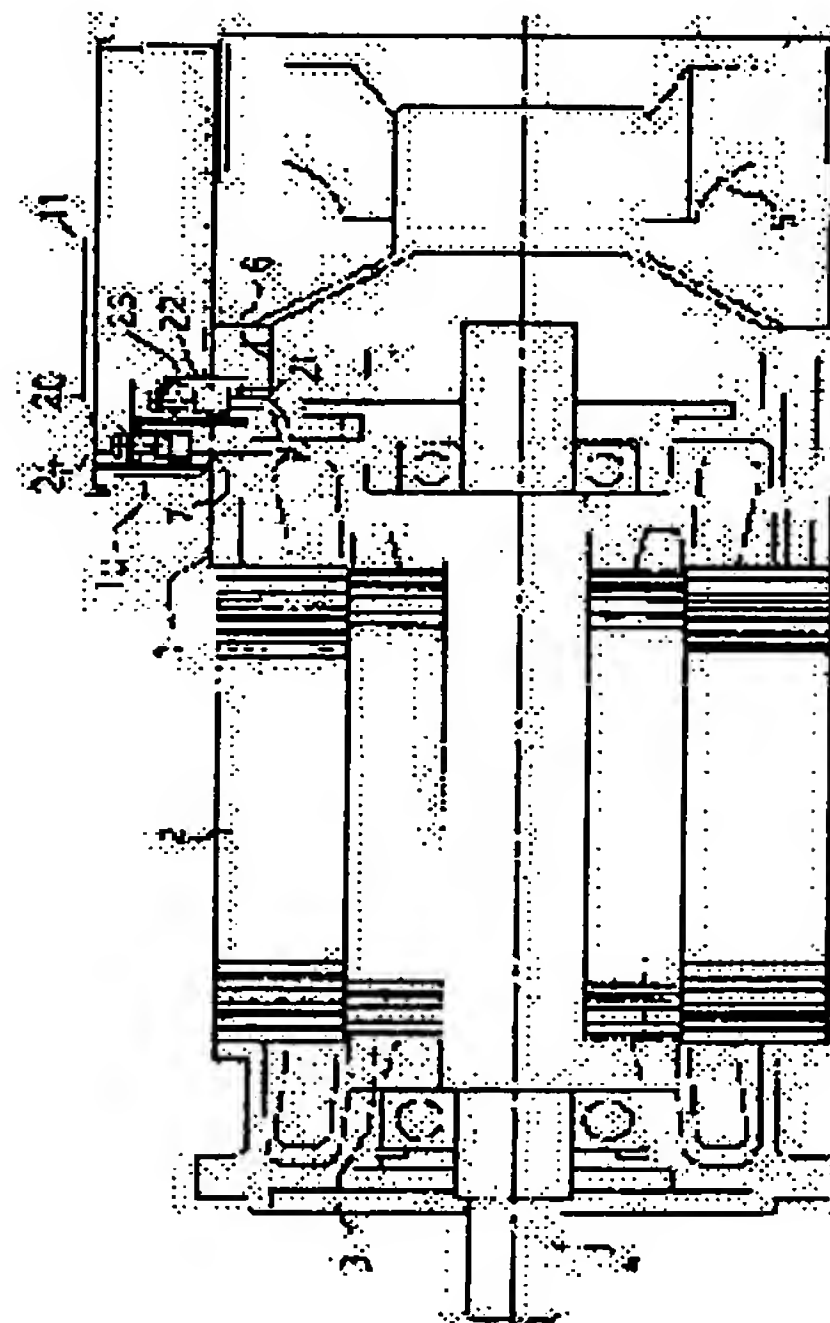
Priority number : 2000326579 Priority date : 26.10.2000 Priority country : JP

(54) TERMINAL BOARD OF MOTOR

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a compact terminal board which can easily change windings and can improve the rate of automatization of assembling and inspection processes.

SOLUTION: The terminal board 20 is mounted to a hole 6 for terminal block of a housing 1 of a motor. A lead-out wire 7 of a stator winding is pressure contacted to a pressure contact portion 22 of a lead-out terminal 21. A conductive plate 23 of the lead-out terminal 21 is bent and inserted to the lower side of a screw 24 of a power supply terminal of the terminal board 20. The tip of a power supply cable is inserted in between the screw 24 and conductive plate 23 and screwed to connect the power supply cable and the winding. Since the lead-out wire 7 is connected to the terminal at the lower side of the terminal board 20 and does not appear in a space within a terminal box 10, the space which the power supply cable can occupy becomes large and therefore the connection to the terminal is facilitated. Accordingly, the change of windings such as delta and star connections can be facilitated. Since the lead-out wire 7 is mounted to the terminal board 20 and its position and attitude are also fixed, the inspection of the winding can be made easily at assembling.



LEGAL STATUS

[Date of request for examination] 24.10.2001

[Date of sending the examiner's decision of rejection] 02.11.2004

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11)特許出願公開番号
特開2002-204549
(P2002-204549A)

(43)公開日 平成14年7月19日(2002.7.19)

(51) Int Cl. 7

識別記号

FI

テ-マコ-ト (参考)

H O 2 K 5/22
3/38

H O 2 K 5/22
3/38

5H604
A 5H605

審査請求 有 請求項の数14 OL (全 11 頁)

(21)出願番号 特願2001-325845(P2001-325845)

(22) 出願日 平成13年10月24日(2001. 10. 24)

(31)優先權主張番号 特願2000-326579(P2000-326579)

(32) 優先日 平成12年10月26日 (2000. 10. 26)

(33) 優先権主張国 日本 (J P)

(71)出願人 390008235

ファナック株式会社

山梨県南都留郡忍野村忍草字古馬場3580番地

(72)発明者 勝沢 幸男

山梨県南都留郡忍野村忍草字古馬場3580番
地 ファナック株式会社内

(72)発明者 前田 宜信

山梨県南都留郡忍野村忍草字古馬場3580番
地 ファナック株式会社内

(74) 代理人 100082304

弁理士 竹本 松司 (外4名)

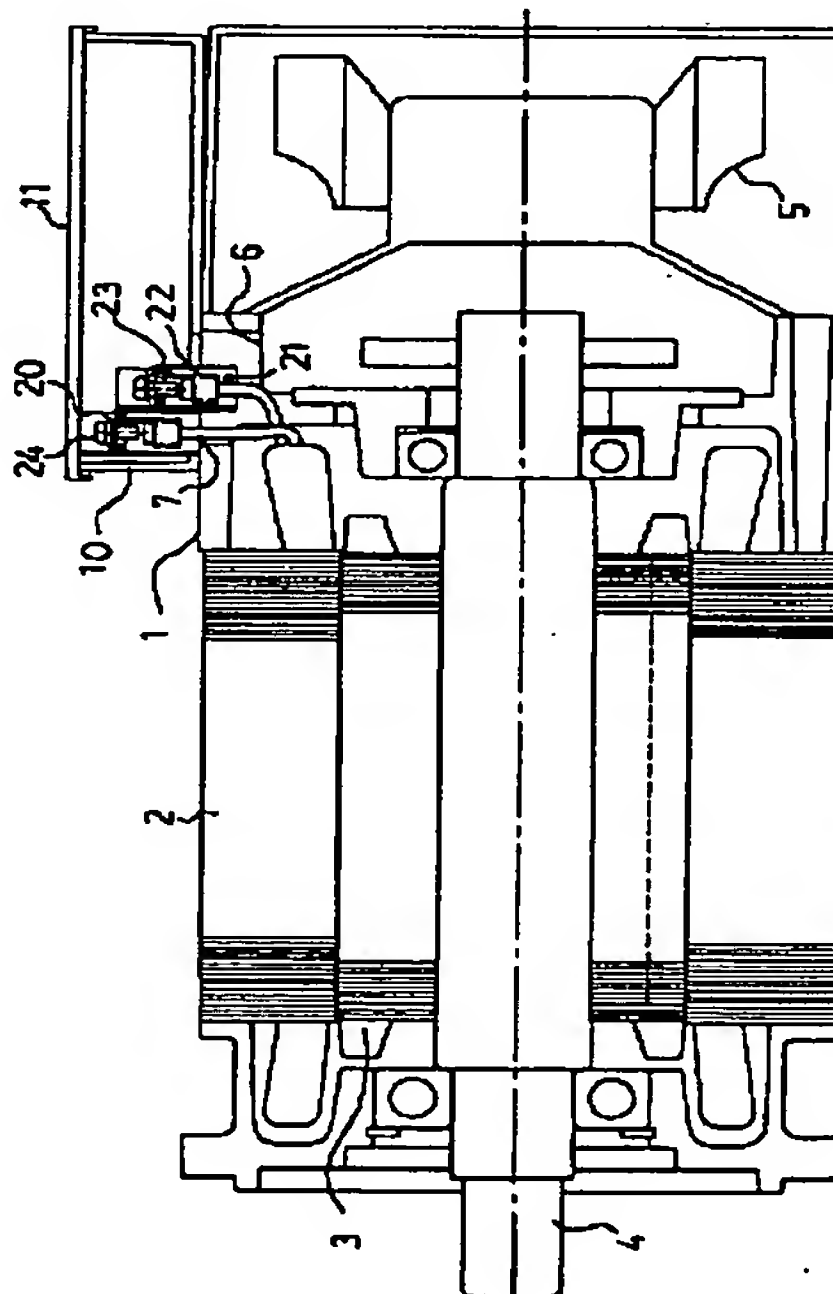
最終頁に続く

(54) 【発明の名称】 電動機の端子台

(57) 【要約】

【課題】 コンパクトで、巻線切換等が容易でかつ組立検査工程の自動化率を向上させることのできる端子台を提供する。

【解決手段】 電動機のハウジング１の端子ブロック用孔６の位置に端子台２０が取り付けられる。固定子巻線の口出し線７は口出し端子部２１の圧着部２２により圧着接続される。口出し端子部２１の導電板部２３は、端子台２０の電源端子部のネジ２４の下方に折り曲げられ挿入されている。ネジ２４と導電板部２３の間に電源ケーブルの先端を挿入しネジ締めして電源ケーブルと巻線を接続する。端子台２０の下方で口出し線７が端子に接続され端子箱１０内の空間に現れないので、電源ケーブルが占有できる空間が大きく端子への接続が容易となる。これにより、デルタ、スター等の巻線切換が容易。口出し線７が端子台２０に取り付けられその位置、姿勢が固定されるから、組立時の巻線検査が容易となる。



【特許請求の範囲】

【請求項1】 電動機のハウジングに穿たれた孔の周縁部又は該孔の近傍に固定され、該電動機の外部から電気を供給する電源ケーブルと該電動機の固定子巻線の口出し線とを接続するための電動機の端子台であって、該端子台は、上面に前記電源ケーブルを接続する電源端子部と、その下部に前記口出し線を接続する口出し線接続部が設けられ、前記電源端子部と前記口出し線接続部は導電体で接続されていることを特徴とする電動機の端子台。

【請求項2】 前記口出し線は端子台の下側で接続され、電源ケーブルは端子台の上面位置で前記電源端子部で接続されるように構成されている請求項1記載の端子台。

【請求項3】 前記口出し線は、該口出し線を前記ハウジングより取り出す孔の向き方向と略同一の方向の姿勢で前記口出し線接続部と接続され、前記ケーブルは、前記端子台の前記ハウジングの取り付け面と略並行の面上で前記電源端子部で接続されるように構成されている請求項2記載の端子台。

【請求項4】 電動機のハウジングに穿たれた孔の周縁部又は該孔の近傍に固定され、該電動機の外部から電気を供給する電源ケーブルと該電動機の固定子巻線の口出し線とを接続するための電動機の端子台であって、該端子台には、前記電源ケーブルを接続する電源端子部と前記口出し線を接続する口出し端子部とが固着され、該口出し端子部は、圧着部と導電部とが一体に構成され、該圧着部が前記口出し線を圧着し、前記導電部が前記電源端子部に接続されることを特徴とする電動機の端子台。

【請求項5】 前記電源端子部はネジ端子を備え、前記口出し端子部は鉤の手状をなし、前記口出し線が前記圧着部の下方から嵌着され、前記導電部の板状部が前記ネジ端子のネジ部に水平方向に間着されていることを特徴とする請求項4記載の電動機の端子台。

【請求項6】 電動機のハウジングに穿たれた孔の周縁部又は該孔の近傍に固定され、該電動機の外部から電気を供給する電源ケーブルと該電動機の固定子巻線の口出し線とを接続するための電動機の端子台であって、該端子台には、口出し端子部を嵌合固定する装着部を有し、口出し端子部は、前記電源ケーブルを接続する電源端子部と、前記口出し線を圧着して接続する圧着部と、該電源端子部と圧着部を接続する導電部とで構成されていることを特徴とする電動機の端子台。

【請求項7】 前記圧着部は、管状に形成され、口出し線を該管に挿入してカシメて口出し線を圧着接続し、前記導電部の板状部は、前記圧着部と前記電源端子部と接続する先端部間に前記圧着部に挿入された口出し線の先端と当接し、その移動を阻止する壁を備える請求項4、請求項5又は請求項6記載の電動機の端子台。

【請求項8】 前記壁は、前記導電部の板状部を折り曲

げて形成されている請求項7記載の電動機の端子台。

【請求項9】 前記壁は、前記導電部の板状部に別部材を付加することによって形成されている請求項7記載の電動機の端子台。

【請求項10】 前記圧着部端面と前記壁間に隙間を設け、該隙間から口出し線を確認できるようにした請求項7、請求項8又は請求項9記載の電動機の端子台。

【請求項11】 前記圧着部の先端が閉鎖された管とされ、該圧着部の側面に口出し線を監視できるのぞき窓が形成されている請求項5又は請求項6記載の電動機の端子台。

【請求項12】 前記口出し端子部は直線状をなし、前記電源端子部はネジ端子を備え、前記口出し線が前記口出し端子部の下方から嵌着され、前記導電部のが前記ネジ端子に下方から装着されていることを特徴とする請求項4記載の電動機の端子台。

【請求項13】 前記導電部にはネジ部が固着され、ネジを該ネジ部に締結することで、前記導電部を前記電源端子部へ接続することを特徴とする請求項12記載の電動機の端子台。

【請求項14】 前記端子台は、電動機のハウジングに穿たれた前記口出し線を取り出す孔の真上で端子箱の端に位置づけられている請求項1乃至13の内1項記載の電動機の端子台。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、電動機に関するもので、特に、電動機の固定子巻線と外部電源ケーブルとの接続を行う端子台に関するものである。

【0002】

【従来の技術】図12は、電動機のハウジングに取り付けられた従来の端子台の構造を示す図で、モータ軸の中心線に沿って切断した断面図を示している。この実施形態では、工作機械の主軸駆動用電動機に適用した例を示している。図12において、符号1は電動機のハウジングで、2は固定子、3はロータ、4はロータ軸、5は電動機を冷却するファンである。ハウジング1には、固定子2の各相巻線の口出し線7をハウジング1の外へ引き出すための口出し線用孔9が設けられている。ハウジング1には、端子台80を一体的に備えた端子箱10が取り付けられており、前記口出し線用孔9から取り出された各相の口出し線7はこの端子箱内に導かれてその先端は端子台80の圧接端子83によって導電板81に接続されている。

【0003】図13は、この端子箱10内の端子台80を上方からみた図で、各固定子巻線の口出し線7、7の先端は、端子台80に設けられた圧接端子83、83、83のネジ82、82、82によって、各導電板81、81、81に電氣的に接続されている。又、各導電板81、81、81の他端には電源ケーブル70、7

0, 70を接続する圧接端子84, 84, 84が設けられ、各相の電源ケーブル70, 70, 70がそれぞれ圧接端子のネジ82によって各々の導電板81, 81, 81に接続されている。図13では、3端子の接続例を示している。

【0004】上述したように、従来の端子台80と端子箱10は一体成形か端子箱10内に端子台80を組み付けて一体構造としている。そして、電動機を製造するには、この端子箱10、電動機を構成する固定子2、ロータ3、ファンモータ等は事前にそれぞれ別の工程で製造し、最終組立工程で組み合わされている。この最終組立工程においては、ハウジング1の口出し線用孔9から口出し線7を導入し、端子箱10の孔にこの口出し線を通して端子箱10をハウジング1に組み付けている。そして、端子箱10を組み付けた後に、口出し線7の先端を圧接端子83のネジ82によって、端子台80の導電部81に人手によってネジ締めして、電氣的に接続している。

【0005】

【発明が解決しようとする課題】電動機の出力仕様を向上させる有効な方法の1つに、スター結線又はデルタ結線に切り替えるための巻線切換を行うことによって、電動機に要求される最適の速度特性やトルク特性を得るようになる方法が採用されている。この場合、3端子を6端子にして巻線切換を行う必要があるが、6端子にするには、端子箱内の端子台を2倍の大きさにしなければならず、端子箱自体の大きさも大きくするしか方法がなかった。これでは、省スペース化、省資源化に反する。工作機械等の業界では、機械の省スペース化、省資源化を技術開発の動向としており、この動向にも反する。

【0006】又、特に海外の安全規格への対応やコストカットのために電源側のケーブル径を大きくすると、ケーブルの曲げ半径が大きくなり従来の端子箱内では電源ケーブルを端子台に接続することが困難な場合が生じている。

【0007】さらに、製造者側からの問題としては、上述したように、口出し線の端子台への接続は人手によって行われている。組立ラインにおいて自動と手動の作業が混在することは効率・安全上好ましくなく、全てを自動化できるようにすることが望ましい。さらに、口出し線は柔軟性があり屈曲するものであるからその姿勢が不確定で、位置、姿勢を確定することが難しい。そのため、自動で端子台にネジ締めすることは難しい。又、この位置姿勢を確定できないことから、自動で巻線の検査を行うようにするとしても、接触子等を口出し線に接触させることが困難で巻線の検査も自動化することが難しい。これらの事項が要因となって、電動機の組立工程全体の自動化推進の妨げとなっている。

【0008】そこで、本発明は電源ケーブルと口出し線との接続を行う端子台を改良することによって、従来と

同サイズの電動機で、巻線切換等による複数の出力仕様を得ることができ、組立検査工程の自動化率を上げることができる端子台を提供することにある。

【0009】

【課題を解決するための手段】上記課題を解決するために、電動機のハウジングに穿たれた孔の周縁部又は該孔の近傍に固定され、該電動機の外部から電気を供給する電源ケーブルと該電動機の固定子巻線の口出し線とを接続するための電動機の端子台において、請求項1に係わる発明は、端子台には、上面に前記電源ケーブルを接続する電源端子部と、その下部に前記口出し線を接続する口出し線接続部が設けられ、前記電源端子部と前記口出し線接続部は導電体で接続するようにすることにより、口出し線が端子箱内にいることを防止して電源ケーブルが占有できる端子箱内の領域空間を大きくした。

【0010】さらに、請求項2に係わる発明は、前記端子台を前記口出し線を取り出す取り出し口位置に設け、前記口出し線を端子台の下側で接続し、電源ケーブルは端子台の上面位置の前記電源端子部で接続されるように構成した。又、請求項3に係わる発明は、前記口出し線が該口出し線を前記ハウジングより取り出す孔の向き方向と略同一の方向の姿勢で前記口出し線接続部と接続され、前記ケーブルが前記端子台の前記ハウジングの取り付け面と略並行の面上で前記電源端子部と接続されるように構成されている。

【0011】又、請求項4に係わる発明は、該端子台に、前記電源ケーブルを接続する電源端子部と前記口出し線を接続する口出し端子部とを固着し、該口出し端子部は、圧着部と導電部とを一体に構成し、該圧着部が前記口出し線を圧着して導電部が前記電源端子部に接続されるようにした。そして、請求項5に係わる発明においては、前記電源端子部にネジ端子を備え、前記口出し端子部を鉤の手状とし、前記口出し線が前記圧着部の下方から嵌着され、前記導電部の板状部が前記ネジ端子のネジ部に水平方向に間着されているようにした。

【0012】また、請求項6に係わる発明は、口出し端子部を電源ケーブルを接続する電源端子部と、前記口出し線を圧着して接続する圧着部と、該電源端子部と圧着部を接続する導電部とで構成し、該端子台にこの口出し端子部を嵌合固定する装着部を備えるようにした。

【0013】請求項7に係わる発明は、上述した口出し端子部の圧着部を管状に形成し、口出し線を該管に挿入してカシメて口出し線を圧着接続するようにし、導電部の板状部は、圧着部と電源端子部と接続する先端部間に前記圧着部に挿入された口出し線の先端と当接し、その移動を阻止する壁を備えるようにした。そして、この壁を、請求項8に係わる発明は、前記導電部の板状部を折り曲げて形成し、請求項9に係わる発明は、導電部の板状部に別部材を付加することによって形成した。また、請求項10に係わる発明は、前記圧着部端面と前記壁間

に隙間を設け、該隙間から口出し線を確認できるようにした。請求項11に係わる発明は、圧着部の先端が閉鎖された管とし、該圧着部の側面に口出し線を監視できるのぞき窓が形成した。

【0014】さらに、請求項12に係わる発明は、前記口出し端子部を直線状をなし、前記電源端子部にネジ端子を設け、前記口出し線は前記口出し端子部の下方から嵌着し、前記導電部の板状部は前記ネジ端子の下方から装着され流用に構成されている。

【0015】請求項13に係わる発明は、前記導電部にネジ部が固着され、ネジを該ネジ部に締結することで、前記導電部を前記電源端子部へ接続するようにされている。又、請求項14に係わる発明においては、前記端子台が、電動機のハウジングに穿たれた前記口出し線を取り出す孔の真上で端子箱の端に位置付けられていることを特徴とするものである。

【0016】

【発明の実施の形態】図1は本発明の一実施形態の端子台を電動機に取り付けたときの状態を説明する図で、モータ軸の中心線に沿って切断した断面図を示している。又、図2は、この端子箱10内の端子台20を上方からみた図である。

【0017】図1において、図12で示した従来例と同一の部材には同一の符号を付している。1は電動機のハウジングで、2は固定子、3はロータ、4はロータ軸、5は電動機を冷却するファンである。ハウジング1には、固定子2の各相巻線の口出し線7と外部電源ケーブル70とを接続する端子台を装着するための端子ブロック用孔6が設けられている。この端子ブロック用孔6の部位には、端子台20が止めネジ等の固着手段（図示せず）によって電動機のハウジング1に固定されている。この図1、図2に示す実施形態では、図2から明かのように、端子台20は6端子で構成されているものである。端子台20には6個の端子部が形成され、該各端子部に口出し端子部21が装着され、この端子台20の端子部と口出し端子部及び後述する電源端子部を構成するネジ24によってそれぞれの端子を構成している。各口出し端子部21は、口出し線接続部を構成する口出し線7を圧着接続する圧着部22と、電源端子部を介してケーブルとの接続を図る導電部である導電板部23が一体

【0018】各巻線の口出し線7には、その先端が各口出し端子部21の圧着部22により圧着されて、口出し端子部21それぞれ接続されている。各口出し端子部21の圧着部22と一体に形成された導電板部23の他端は、電源端子部を構成するネジ24により外部電源ケーブル70と接続されるようになっている。口出し線接続

部を構成する圧着部22は、該口出し端子部21の下方で、口出し線7が下方から上方へ向けて圧着部22に嵌挿され圧着されるよう構成され、導電板部23は上面すなわち端子台20の上面位置で電源ケーブル70と接続できるように構成されている。又、符号10は端子箱であり、端子台20を覆うようにして、かつ、端子台20がこの端子箱10の一端に位置するように配置されている。なお、符号11は端子箱10の蓋である。

【0019】又、図2に示すように、端子台20は、電源ケーブル70を接続する電源端子部が段差をもって構成され、各段には3つの端子部が備えられ、これにそれぞれ口出し端子部21及びネジ24が取り付けられることによって、合計8端子を備えている。各電源ケーブル70の先端は各口出し端子部21の導電板部23に電源端子部のネジ24で締め付けられ圧着接続されるようになっている。しかも、端子台20は端子箱10の一端部に配置されている。すなわち、モータのハウジング1の端子ブロック用孔6に取り付けられた端子台20が端子箱の一端部に来るように端子箱10がハウジング1に取り付けられている。このことから、端子箱10内には空間が偏って形成され、この空間によって、電源ケーブル70は大きな曲率半径で曲げることができるので、径の大きな電源ケーブル70でも容易に端子台20に接続することができる。図3は、端子台の端子の数3である場合の例で、図2と同様に端子箱内の端子台を上方からみた図である。

【0020】図4は、本実施形態における接続端子を形成する口出し端子部21の説明図で、図4(a)はその正面図、図4(b)は上面図、図4(c)は底面図、図4(d)は右側面図である。この口出し端子部21は導電体で鉤の手状に形成され、下部には口出し線7を挿入して圧着する圧着部22が管状に形成されている。この圧着部22と一体となって導電板部23が形成され、この導電板部23は、略90度折り曲げられ、先端は二股に形成され、この二股の間にネジ24の軸部が挿入されるように形成されている。すなわち、導電板部23の二股に形成された先端部の面は、圧着部22の口出し線7挿入孔の方向に対して略垂直な面を形成している。この折り曲げられ、二股に形成された導電板部23の部分はネジ24と共に電源端子部を形成する。

【0021】図5は、この口出し端子部21の端子台への取り付けを説明する図である。図5において、(a)は口出し端子部21の端子台への取り付け動作説明の上面図、(b)は該動作説明の側面図、(c)口出し端子部21の挿入方向からみた端子台の口出し端子部21を取り付ける端子部の正面図、(d)は口出し端子部21を端子台に取り付けた状態の上面図、(e)口出し端子部21を端子台に取り付けた状態の側面図である。

【0022】端子台20の端子部には、図5(b)、(c)、(e)に示すように、ナット25が熱溶着等で

固着されている。このナット 25 にネジ 24 が螺合している。この端子部には、両側に口出し端子部 21 の導電板部 23 の二股状の先端部をガイドする溝 26 が形成されている。

【0023】そこで、口出し端子部 21 の圧着部 22 の管内に口出し線 7 の先端を挿入し、圧着させた後、ネジ 24 のナット 25 への螺合を緩めて、ナット 25 とネジ 24 間に間隙を作り、図 5 (a)、(b) に示すように導電板部 23 の二股状の先端部がネジ 24 の軸部を挟むように挿入する。このとき、導電板部 23 の二股状の先端部は前記溝 26 にガイドされて図 5 (d)、(e) に示すように導電板部 23 の二股状の先端部はネジ 24 の下部に位置づけられる。そして、この導電板部 23 の二股状の先端部とネジの間に電源ケーブル 70 の一端を挿入してネジ 24 を締め付けて電源ケーブル 70 と導電板部 23 を電氣的に接続する。これにより、電源ケーブル 70 と固定子巻線は、口出し端子部 21 を介して電氣的に接続されることになる。

【0024】次に電動機への端子台、端子箱の取り付け作業について説明する。まず、電動機のハウジング 1 の端子ブロック用孔 6 から各巻線の口出し線 7 を取り出し、各口出し線 7 の先端を口出し端子部 21 の圧着部 22 の管内に挿入して圧着して、各口出し線 7 の先端にそれぞれ口出し端子部 21 を取り付ける。又、端子台 20 をハウジング 1 に固着する。次に、図 5 で説明したように、口出し端子部 21 の導電板部 23 における二股状の先端部をネジ 24 の軸部を挟むように挿入し、ネジ 24 を締め付けて口出し端子部 21 を固定し、その後、端子箱 10 をハウジング 1 に固定しする。このとき、端子台 20 が端子箱 10 の一端部に位置するように端子箱 10 をハウジング 1 に固定する。最後に端子箱の蓋 11 を嵌合させて組み立ては終了する。

【0025】この組立作業時に行われる巻線検査については、端子台 20 に各巻線の口出し線 7 に接続された口出し端子部 21 が取り付けられ、その位置が確定されているから、接触子等を確定された位置に移動させればよく、巻線の自動検査も容易となる。

【0026】さらに、口出し線 7 は、ハウジング 1 に穿たれた端子ブロック用孔 6 の位置で、このハウジング 1 から引き出す方向の姿勢で、かつ端子台 20 の下側で口出し端子部 21 の圧着部 22 に接続される。そのため、口出し線 7 が端子箱 10 の空間内を占有することはない。一方、各電源ケーブル 70 は、ハウジング 1 の面とほぼ同じ方向の姿勢で端子台 20 の各端子に接続され、端子箱 20 の空間内を占有することができ、図 2、図 3 に示すように端子箱の空間内で、電源ケーブルを小さな曲率半径で折り曲げることなく端子台に接続することができるもので、接続作業が容易となる。

【0027】上述した第 1 の実施形態において、図 4 に示す口出し端子部 21 の構成は、口出し線 7 をカシメ等

で圧着する圧着部 22 の上方（口出し線 7 を挿入する方向の上方）に電源端子部に接続する導電板部 23 の二股状先端部が配置されている。すなわち該口出し線を挿入する孔の中心線上に導電板部 23 の二股状先端部が配置されている。そのため、口出し線 7 を圧着部 22 の孔に挿入したとき、この引出し線 7 の先端部が電源端子部に接続する導電板部 23 の二股状先端部まで達し、導電板部 23 を電源端子部に接続する障害となる場合が生じる。特に、口出し線 7 の先端の揃えが不十分であると、この障害が発生する可能性が大きくなる。口出し線 7 が太くて硬いエナメル線などで構成されている場合、圧着部 22 に挿入する前に先端部を十分に切り揃えていても、この口出し線 7 を圧着部 22 に挿入して圧着治具で固定作業を行っている間に口出し線 7 の先端が不揃いになってしまうことがあり、導電板部 23 と電源端子部の接続の障害となる。

【0028】この問題を避けるために、図 6 に示すような、先端が閉じた圧着部 22' を有する口出し端子部 21' とすればよい。これによって、圧着部 22' に挿入された口出し線 7 の先端は、閉じられた圧着部 22' の孔にの先端部の壁に当接し閉じ込められ、導電板部 23' の先端部の電源端子部への接続の邪魔はされられる。しかし、この構成であると、圧着部に挿入が不十分な口出し線 7 を見つけ出すことが困難である。

【0029】そこで、口出し線 7 が電源端子部への接続を邪魔することなく、かつ、圧着部に確実に挿入され取り付けられていることを容易に確認できる口出し端子部の態様を図 7 に示す。図 7 (a) は、この実施態様の口出し端子部 121 の側面図であり、図 7 (b) は斜視図、図 7 (c) は口出し線 7 を取り付けた状態を示す図で、図 7 (d) はその断面図である。

【0030】この口出し端子部 121 は、導電体で構成され、口出し線 7 を挿入しカシメ圧着するための孔を有する管状の圧着部 122 と、該圧着部 122 と一体的に構成された板状の導電板部 123 で構成されている点は図 4 に示す例と同一であるが、導電板部 123 の構成がこの実施形態では異なっている。導電板部 123 は、電源端子部へ接続するための二股状に形成された先端部 123a と、該先端部 123a と圧着部 122 を接続する胴部 123b で構成されている。胴部 123b は、圧着部 122 から口出し線 7 の挿入方向に延出し、圧着部 122 の端面と所定距離離れた位置で 90 度折り曲げられ、該端面と平行な面を形成した壁 123c を構成し、さらに 90 度折り曲げられて、口出し線 7 の挿入方向線に延び、さらに 90 度折り曲げられて、二股状に形成された先端部 123a となっている。

【0031】図 7 (c)、(d) に示すように、口出し線 7 の先端を圧着部 122 の管を貫通させ、胴部 123b の圧着部 122 の端面と平行な面の壁 123c に当接するまで、挿入する。このとき、口出し線 7 の先端部が

胴部123bの壁123cと当接することによって、挿入しようとする力に対して負荷が増大するので、確実に圧着部122に挿入されたことがわかる。また、壁123cと圧着部122の端面間に形成された間隙をのぞき窓123dとして利用し、こののぞき窓123dから口出し線7を確認することによって、口出し線7と口出し端子部121との接続を確認することができる。また、口出し線7は壁123cで阻止され、電源端子部と接続する二股状の先端部123aの位置まで達しないから、電源端子部への接続の障害とはならず、容易に電源端子部にこの口出し端子部121の接続ができる。

【0032】図8は、口出し端子部の別の実施形態で、図8(a)は側面図、図8(b)は正面図である。この口出し端子部221と図7に示した口出し端子部121との差異は、この口出し端子部221の導電板部223の胴部223bの構成が相違するのみである。圧着部222から延出した板状の胴部223bは90度折り曲げられ、該圧着部222の端面と平行に形成され、さらに180度折り曲げられて、次に90度折り曲げられて口出し線7の挿入方向線と平行な面を形成している。そして、さらに90度折り曲げられて二股状先端部223aとを形成している。すなわち、口出し線7の移動を阻止する壁223cが2重の板厚で構成されている。なお、符合223dは、壁223cと圧着部222の端面間に形成される間隙である。この口出し端子部221の作用、効果は図7に示した口出し端子部121と同等である。

【0033】図9は、さらに別の口出し端子部の実施形態で、図9(a)は側面図、図9(b)は正面図である。この実施形態の口出し端子部321は、図6に示したように口出し線7が挿入される圧着部322の穴の先端が閉じられ、口出し線7の移動を阻止する壁323c(この壁は、導電板部323の胴部323bを折り曲げて構成してもよい)を構成している。この圧着部322の側面にのぞき窓323dが形成され、こののぞき窓323dより圧着部322の穴内に挿入された口出し線7を確認できるようにしている。この実施形態の口出し端子部321も口出し線の先端が壁323cで阻止され、電源端子部と接続する二股状の先端部323aの位置まで達しないから、電源端子部と口出し端子部321の接続が口出し線7に邪魔されることなく、容易にできる。

【0034】なお、図7～図9に示す口出し線端子の例は、導電板部の胴部に口出し線7の移動、突出を阻止する壁を導電板部に一体的に設けたが、この口出し線7の突出を阻止する壁を導電板部に付加するようにしてもよい。例えば、図4に示す例で、口出し端子21の圧着部22と導電板部23の先端部間に阻止部材を固着して口出し線の移動を阻止する壁とするようにしてもよい。

【0035】図10は、本発明の第2の実施形態の端子台を説明する説明図である。この第2の実施形態では、

端子台30には、各端子部には口出し端子部31を嵌合する嵌合孔35が形成されている。又、口出し端子部31は、口出し線7を圧着して接続する口出し線接続部としての圧着部32と電源ケーブル70との接続部を形成する導電部33が導電体で一体となって形成されている。圧着部32は管状で、口出し線7の先端が下方(電動機ハウジング側)からこの管状の孔内に挿入できるように形成されている。又、電源ケーブルとの接続部を形成する導電部33は、その中心部にこの口出し端子部31の軸方向(圧着部32の管状の孔の中心軸方向と同一方向)に雌ネジが設けられている。そして、この導電部33は端子台30に設けられた嵌合孔35に、図10の左側の端子部に示すように嵌合されて取り付けられる。そして前記雌ネジ36に電源端子部を構成するネジ34が螺合するようになっている。これにより電源端子部が形成される。この第2の実施形態では、端子台30の端子部、口出し端子部31及びネジ34によって各端子を構成している。そして、電源端子部のネジ34と導電部33の間に電源ケーブル70の先端を挿入しネジを締め付けて、電源ケーブルと口出し端子部31とを電氣的に接続することにより、固定し巻線と電源ケーブルの電氣的接続を行う。

【0036】図11は本発明の第3の実施形態の端子台の説明図である。この第3の実施形態では、端子台40の端子部に設けられた嵌合溝45に口出し端子部41が嵌合されることによって端子台40を構成している。図11(a)は、口出し端子部41を嵌合する前の端子台の端子部の嵌入方向からみた図である。又、図11(b)、(c)は、口出し端子部41を端子台40の端子部への嵌合動作の説明図であり、(b)は端子台の上方からみたときの図、(c)はその側面図である。

【0037】この第3の実施形態と前述した第1の実施形態と相違する点は、口出し端子部41の導電板部43の90度折り曲げられた先端部の肉厚が大きく形成され、こり肉厚部にタップ加工がなされ、この雌ネジに螺合するネジ44とで電源端子部を構成している。この導電板部43の90度折り曲げられた先端部を端子台の端子部の嵌合溝45と嵌合させることによって、口出し端子部41を端子台40の端子部に固定して端子を形成する。

【0038】図11(d)は、この第3の実施形態における別の端子の例である。この例では、口出し端子部51の導電板部53の90度折り曲げられた先端部にナット55を溶着させてネジ54と螺合させるように構成することにより口出し端子部51を形成している。そしてこのナット55を有する導電板部43の先端部を端子台の嵌合溝に嵌合させ端子台を形成する。

【0039】図11(e)はこの第3の実施形態におけるさらにもう1つの端子の形態を示す図である。この例は、図11(d)で示したナットの代わりに口出し端子

部61の導電板部63の先端部がバーリング加工65がなされ、この部分65に雌ネジが設けられ、ネジ64と螺合するように構成されている。又このバーリング加工65された導電板部63の先端部が端子台の各端子部の嵌合溝に嵌合されて端子台を形成することは他の第3の実施形態の例と同じである。

【0040】以上説明した各実施形態において、端子を形成する口出し端子部の口出し線を接続するための圧着部は、口出し線をハウジングから取り出す方向（端子）ブロック用孔6の孔の方向）とほぼ同一の方向の口出し線挿入孔を有している。そして、この挿入孔の孔軸と直交する方向、すなわちハウジングの端子箱取り付け面と略並行の面が電源ケーブルの取り付け面としている。このことにより、口出し線は無理に屈曲させたり、力を加えることなく口出し端子部に接続することができる。さらに、電源ケーブルはハウジングの面に沿って這わせてきて、この面と略同じ面で端子台に接続でき、かつ、端子台は端子箱の一端に設けられ、さらに、口出し線と口出し端子との接続部は端子台の反対側の面であるハウジング側面で行われるから、端子箱内には従来の端子箱と比較して大きな空きスペースが形成される。この大きなスペースを利用して電源ケーブルを屈曲させることができるから、屈曲時の曲率半径を大きくすることができ、径の大きいケーブルでも容易に取り付けることができる。また、端子台を電動機のハウジングに固定する方法も、ネジ等でハウジングに直接取付けて固定しても、または他の部材を介してハウジングに固定してもよい。さらには、端子箱の底面等で端子台を電動機のハウジングに押し込んで固定するようにしてもよい。

【0041】

【発明の効果】端子台は端子箱の一端に配置され、かつ巻線からの口出し線はこの端子箱内の空間に現れないことから、電源ケーブルが占有できる面積が大きくなることから、従来と同じサイズの電動機でも巻線切換を容易にすることができ、電動機の性能アップを実現できる。又製造者にとっては、端子箱内の空きスペースが拡大するので、配線作業が容易となり、組立作業が容易となる。又、口出し線位置も固定されることになるから、巻線検査も容易となり自動化を推進することができ、要員の削減やさらなるコストカットが可能となる。

【図面の簡単な説明】

【図1】本発明の第1の実施形態の端子台を用いた電動機のロータ軸に沿った端面図である。

【図2】同第1の実施形態における端子箱の上方から端

子台をみたときの図である。

【図3】同第1の実施形態において3端子としたときの端子箱の上方から端子台をみたときの図である。

【図4】同第1の実施形態における口出し端子部の説明図である。

【図5】本発明の第1の実施形態における口出し端子部の端子台への取り付けの説明図である。

【図6】口出し端子部の圧着部の先端を閉じたものとしたときの説明図である。

10 【図7】本発明の実施形態に用いる口出し端子部の1つの形態の説明図である。

【図8】本発明の実施形態に用いる口出し端子部の別の形態の説明図である。

【図9】本発明の実施形態に用いる口出し端子部のさらに別の形態の説明図である。

【図10】本発明の第2の実施形態の端子台の説明図である。

【図11】本発明の第2の実施形態の端子台の説明図である。

20 【図12】従来の端子台を用いた電動機のロータ軸に沿った端面図である。

【図13】図8に示す従来の端子台を上方からみたときの図である。

【符号の説明】

1 ハウジング

2 固定子

3 ロータ

4 ロータ軸

5 ファン

30 6 端子ブロック用孔

7 口出し線

10 端子箱

11 端子箱蓋

20、30、40、50、60 端子台

21、31、41、51、61 口出し端子部

22、32、42、52、62 圧着部

23、33、43、53、63 導電板部

24、34、44、54、64 ネジ

25、55 ナット

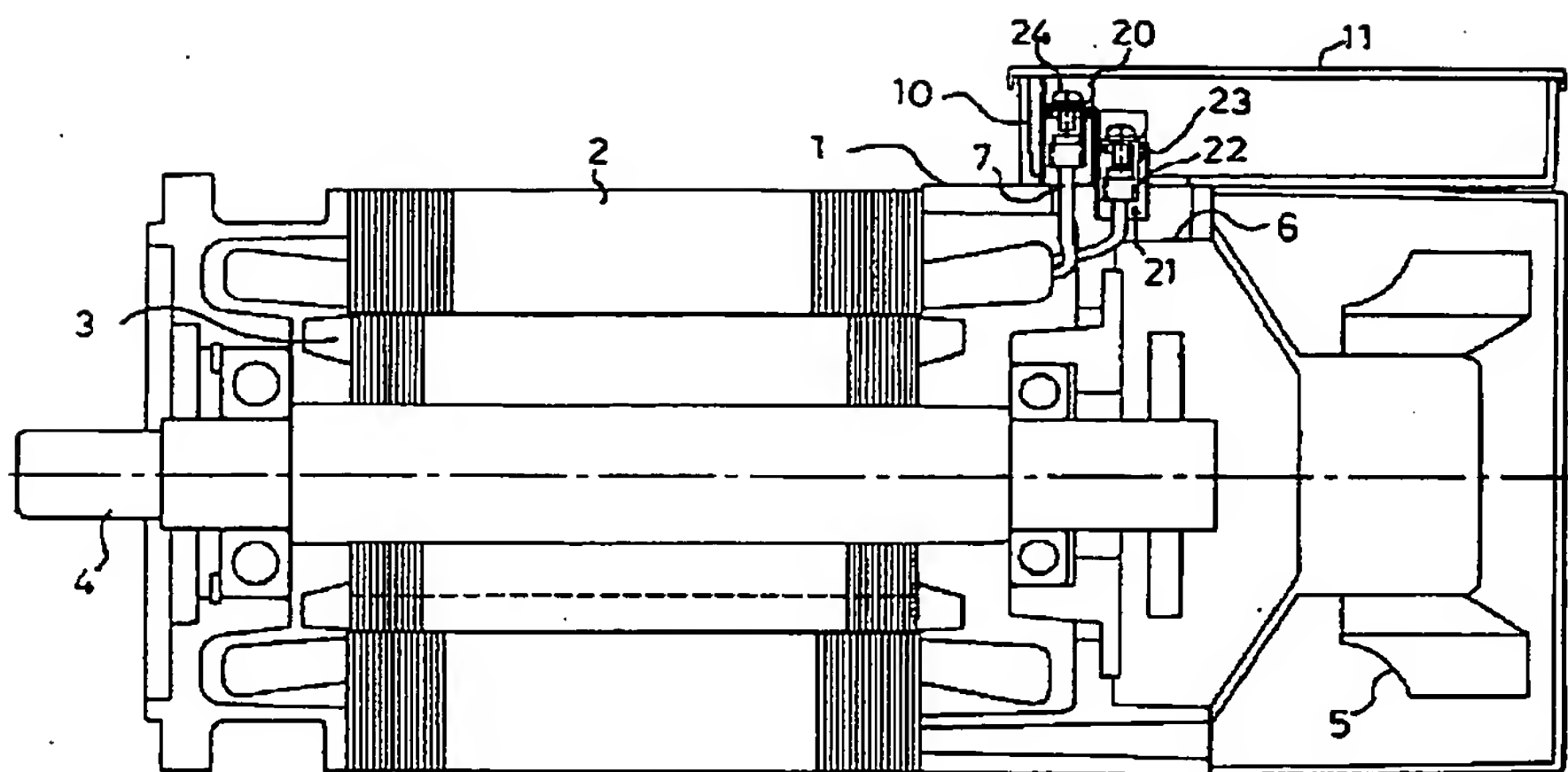
40 35 嵌合孔

36、43 雌ネジ

65 バーリング加工部

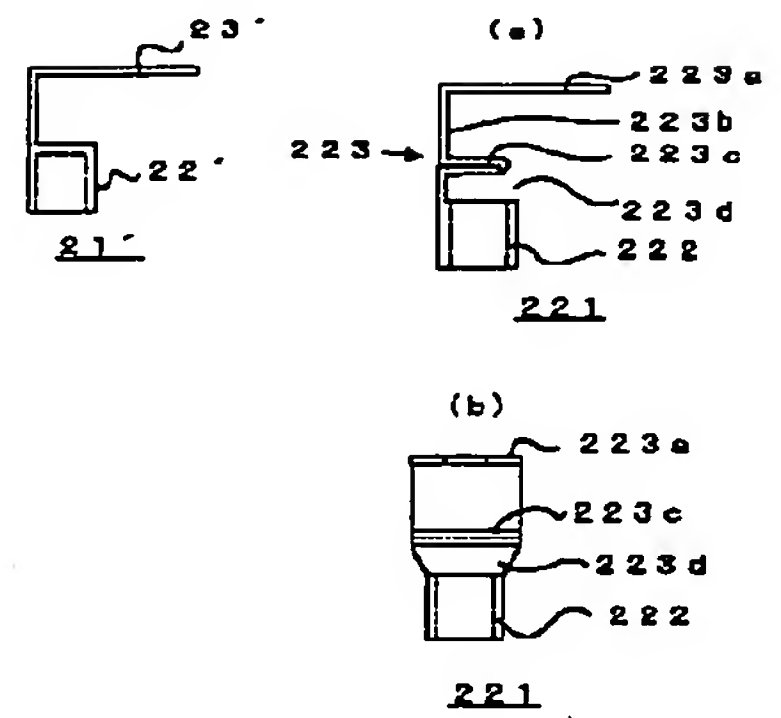
70 電源ケーブル

【図1】



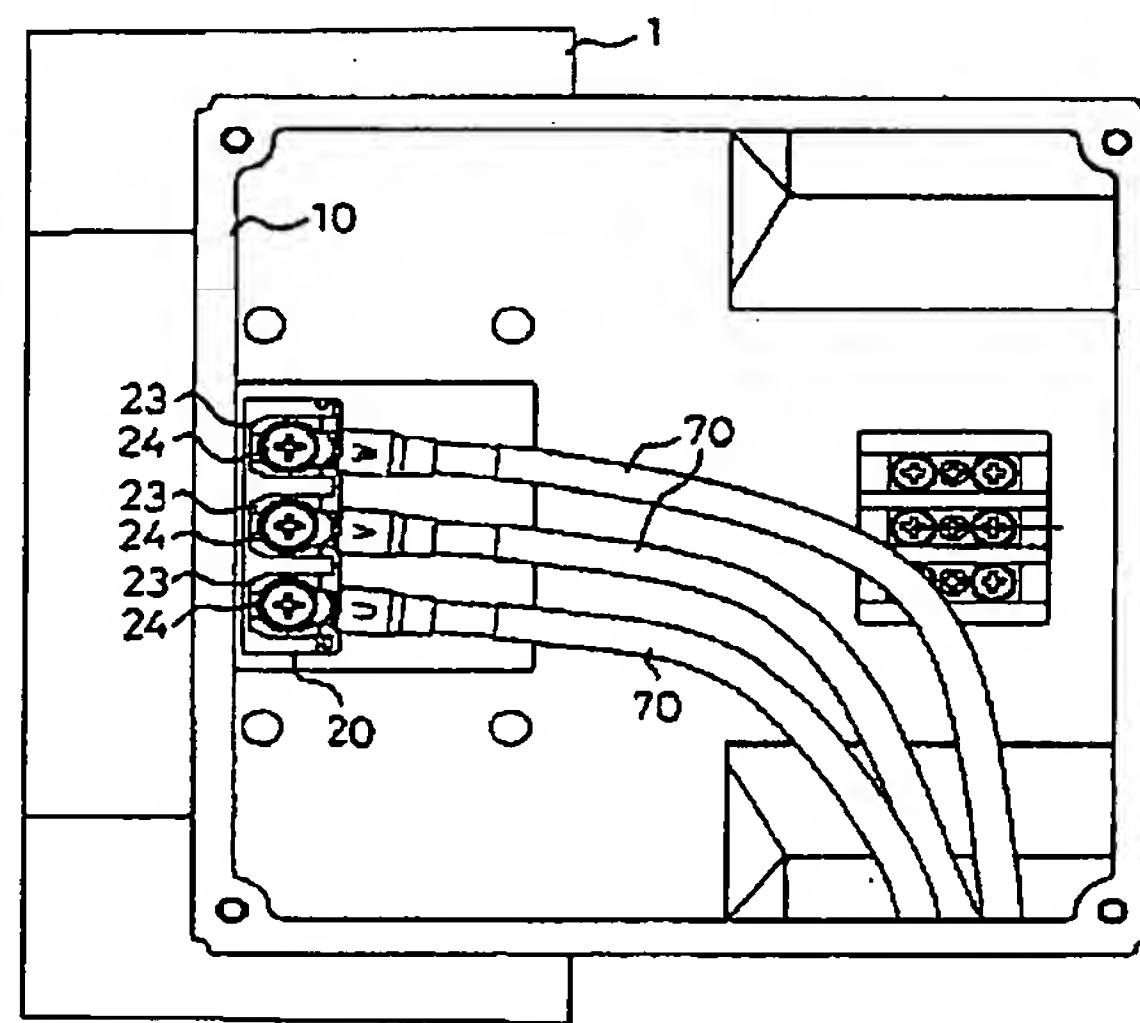
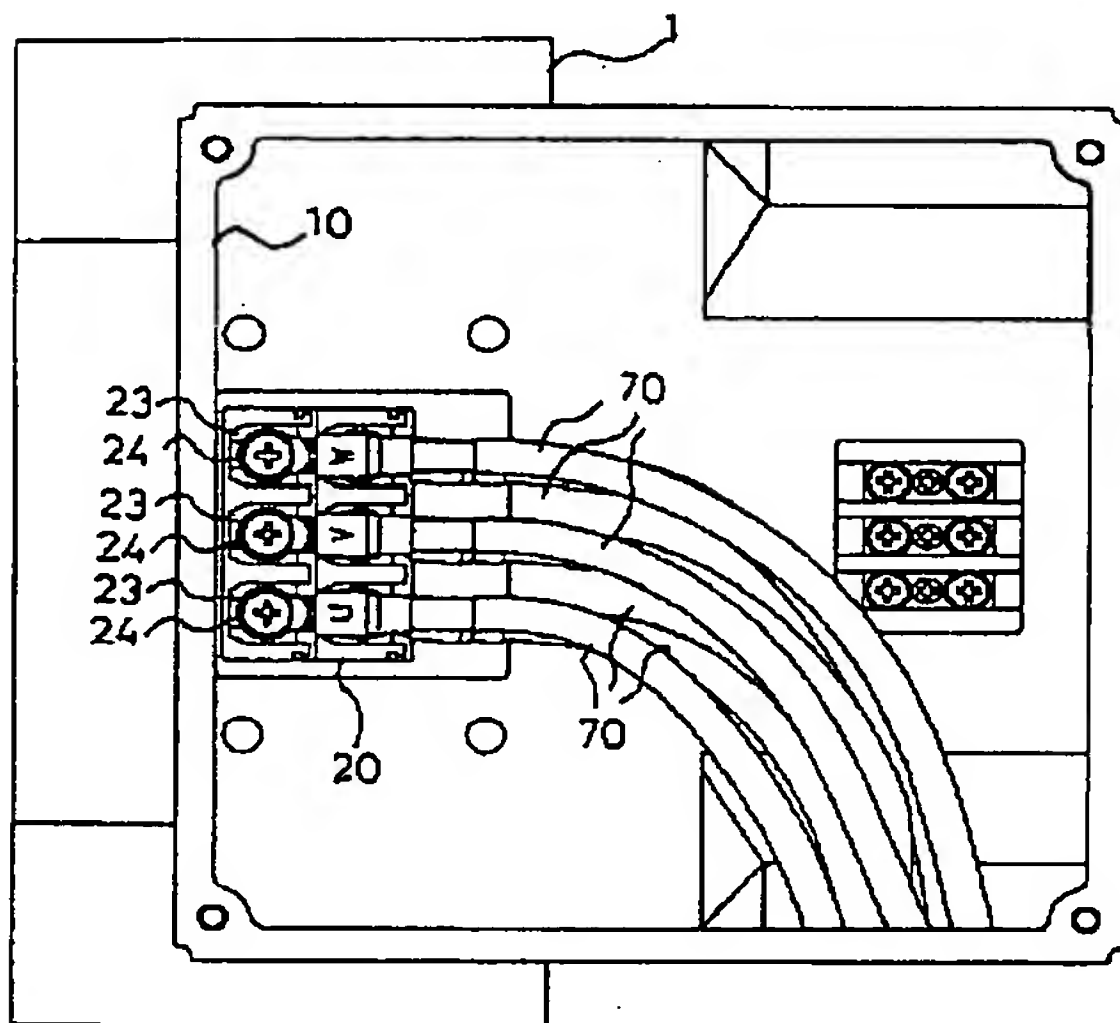
【図6】

【図8】

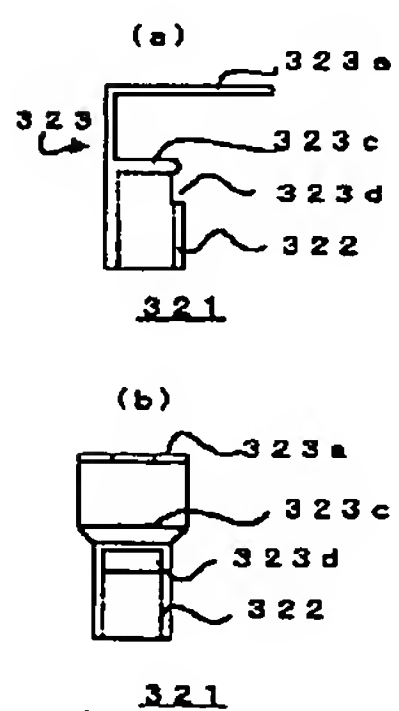


【図2】

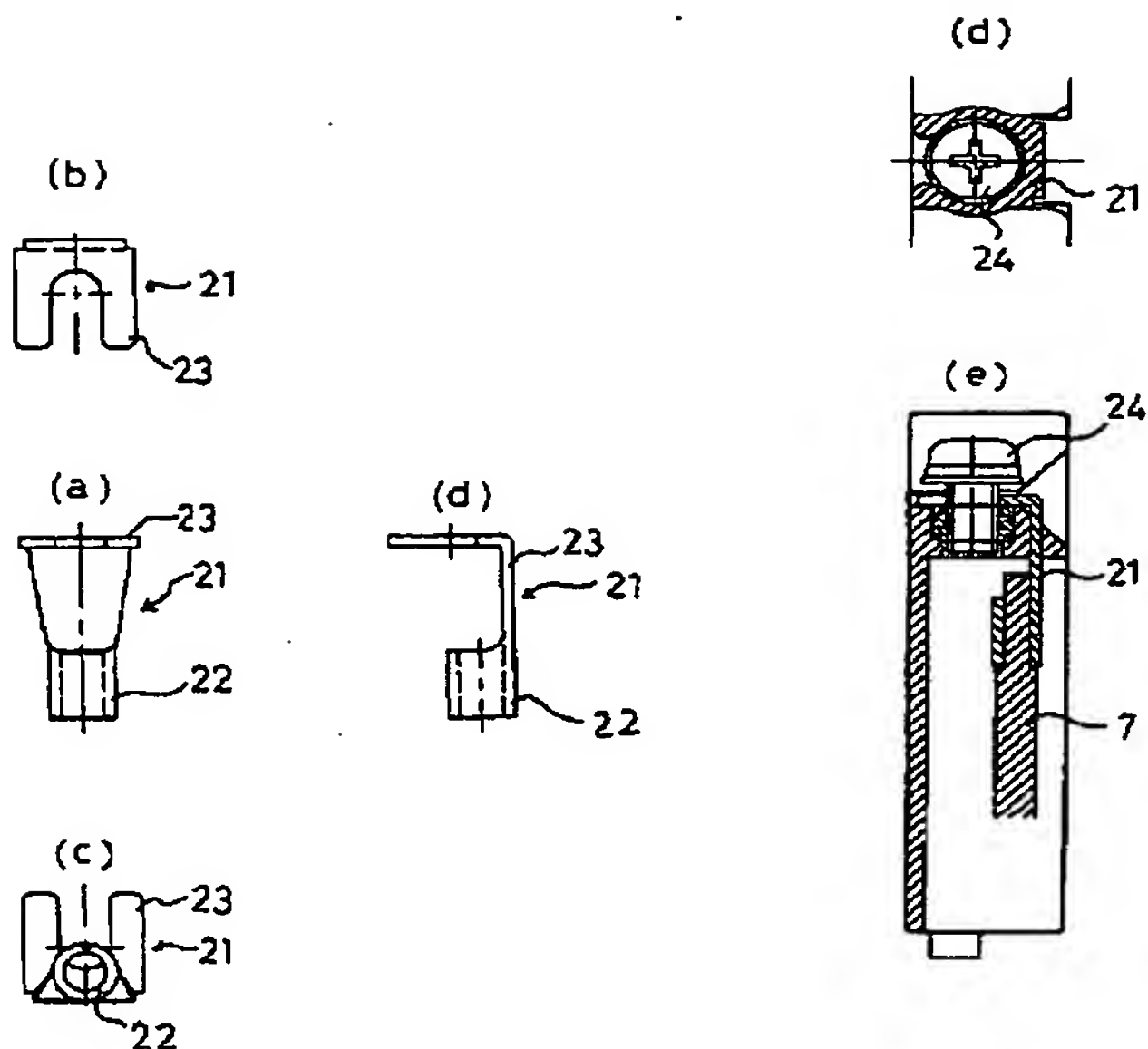
【図3】



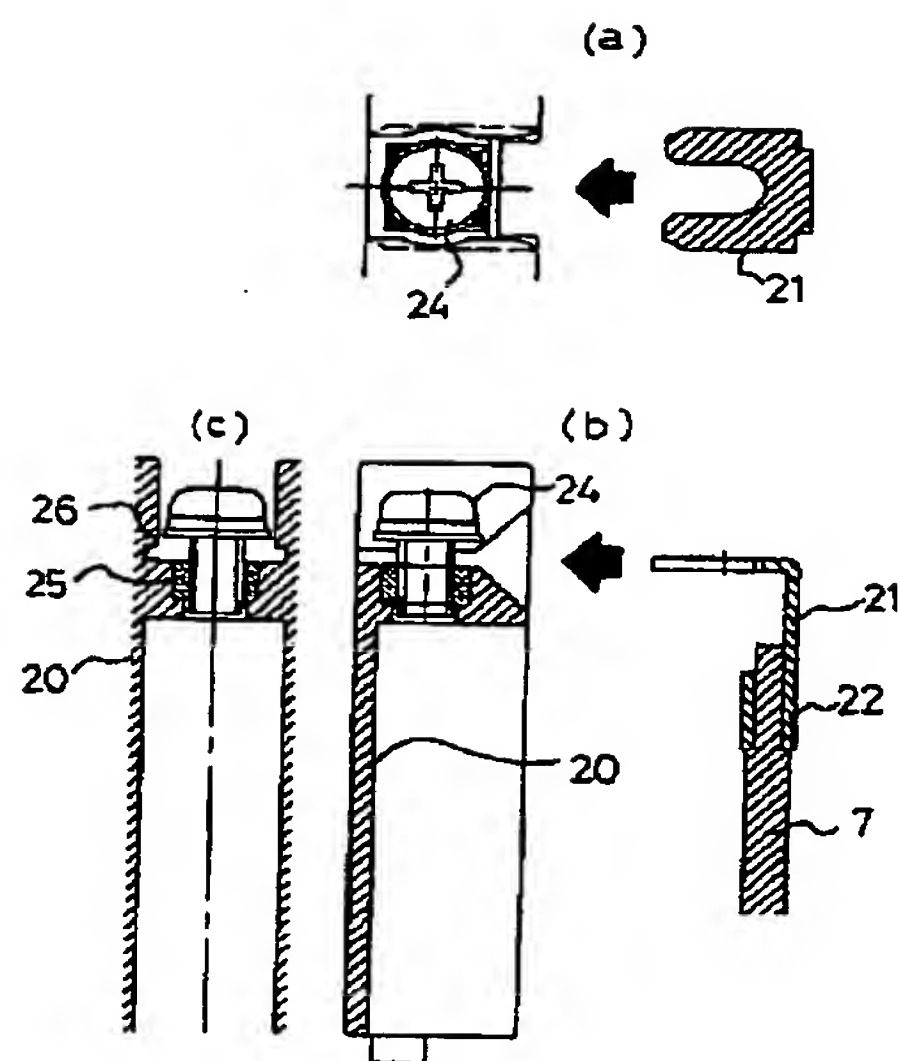
【図9】



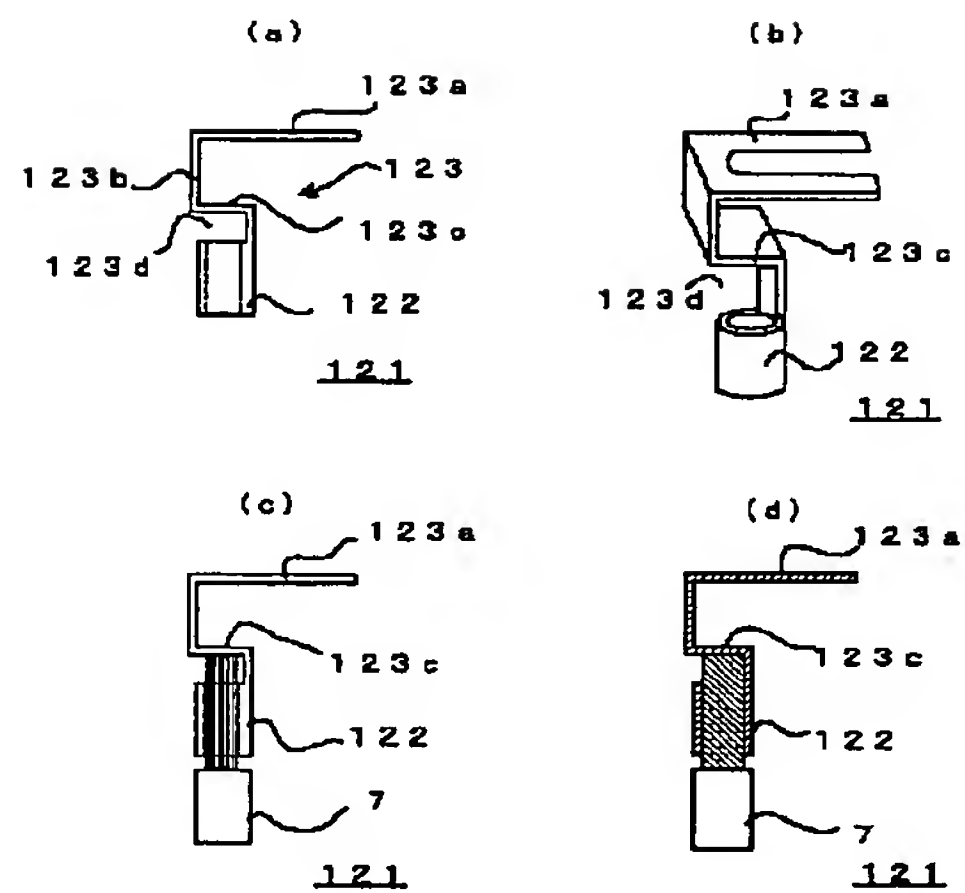
【図4】



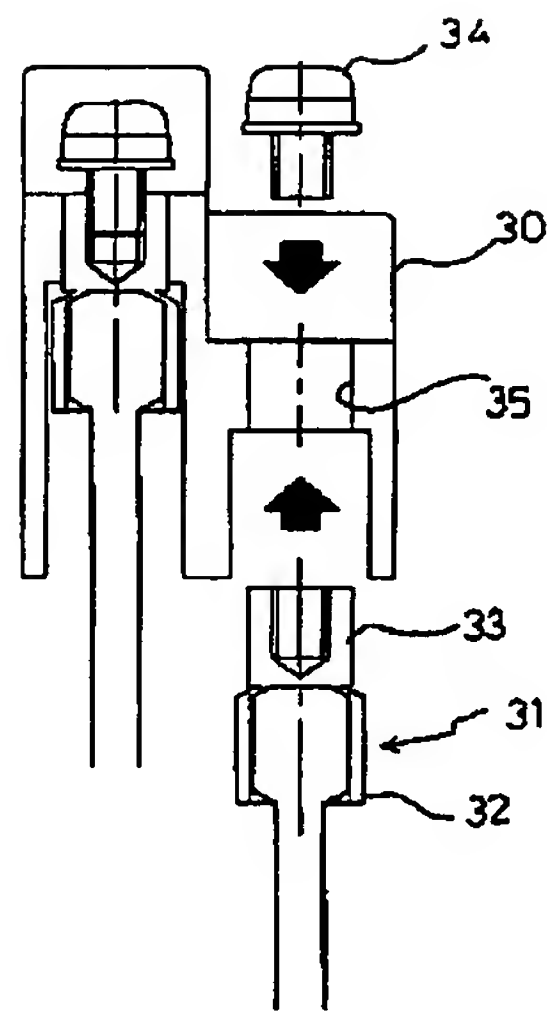
【図5】



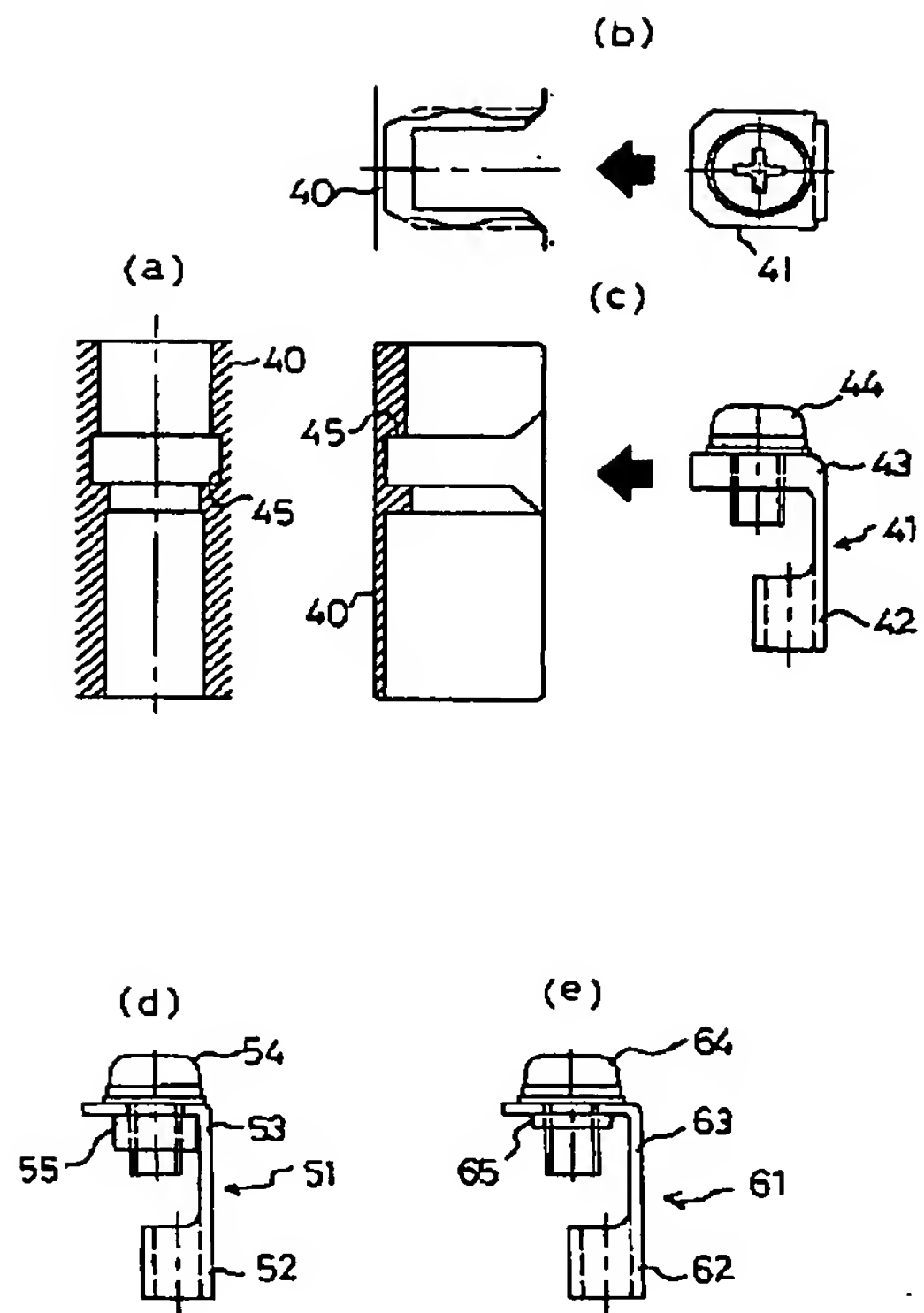
【図7】



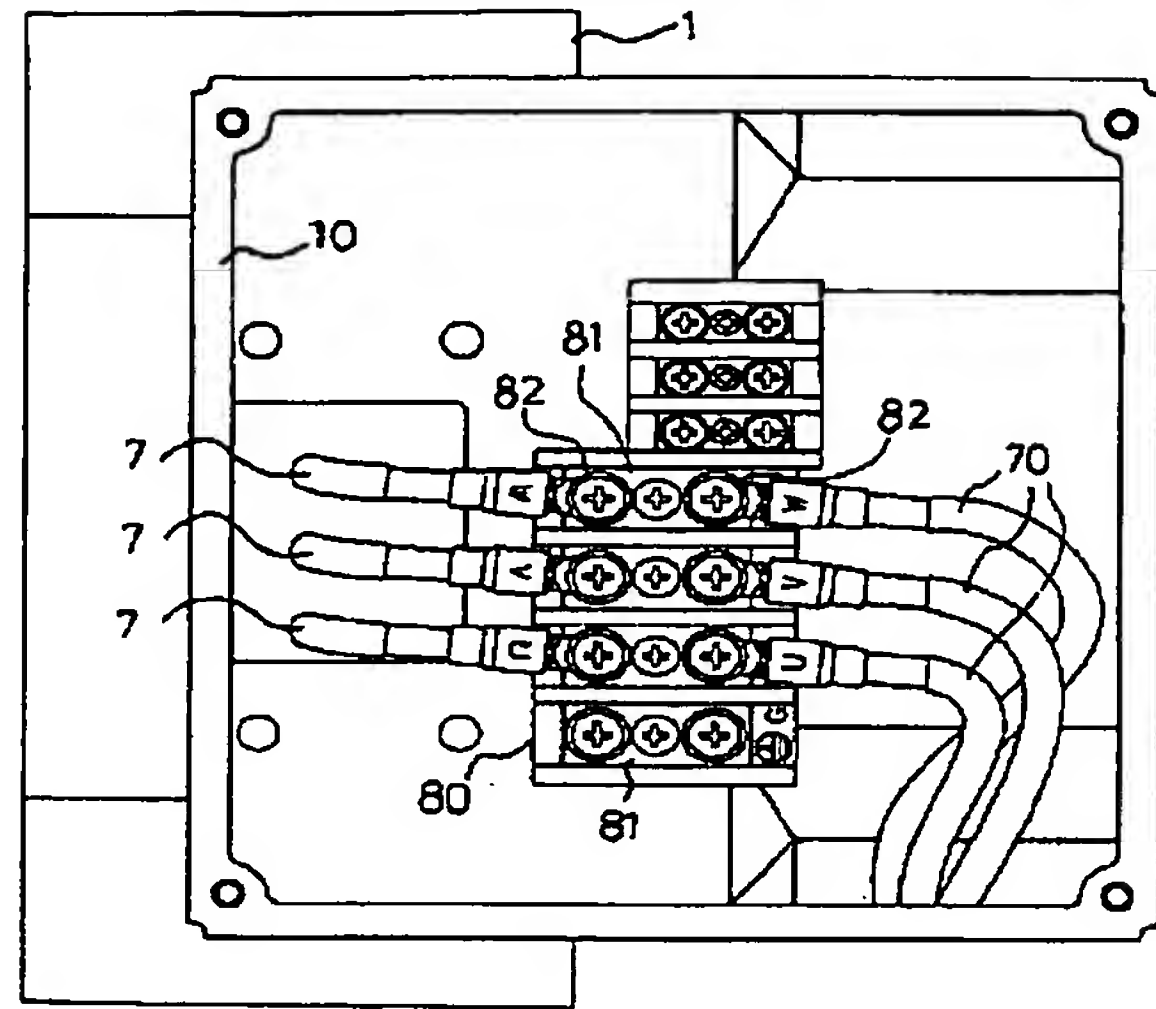
【図10】



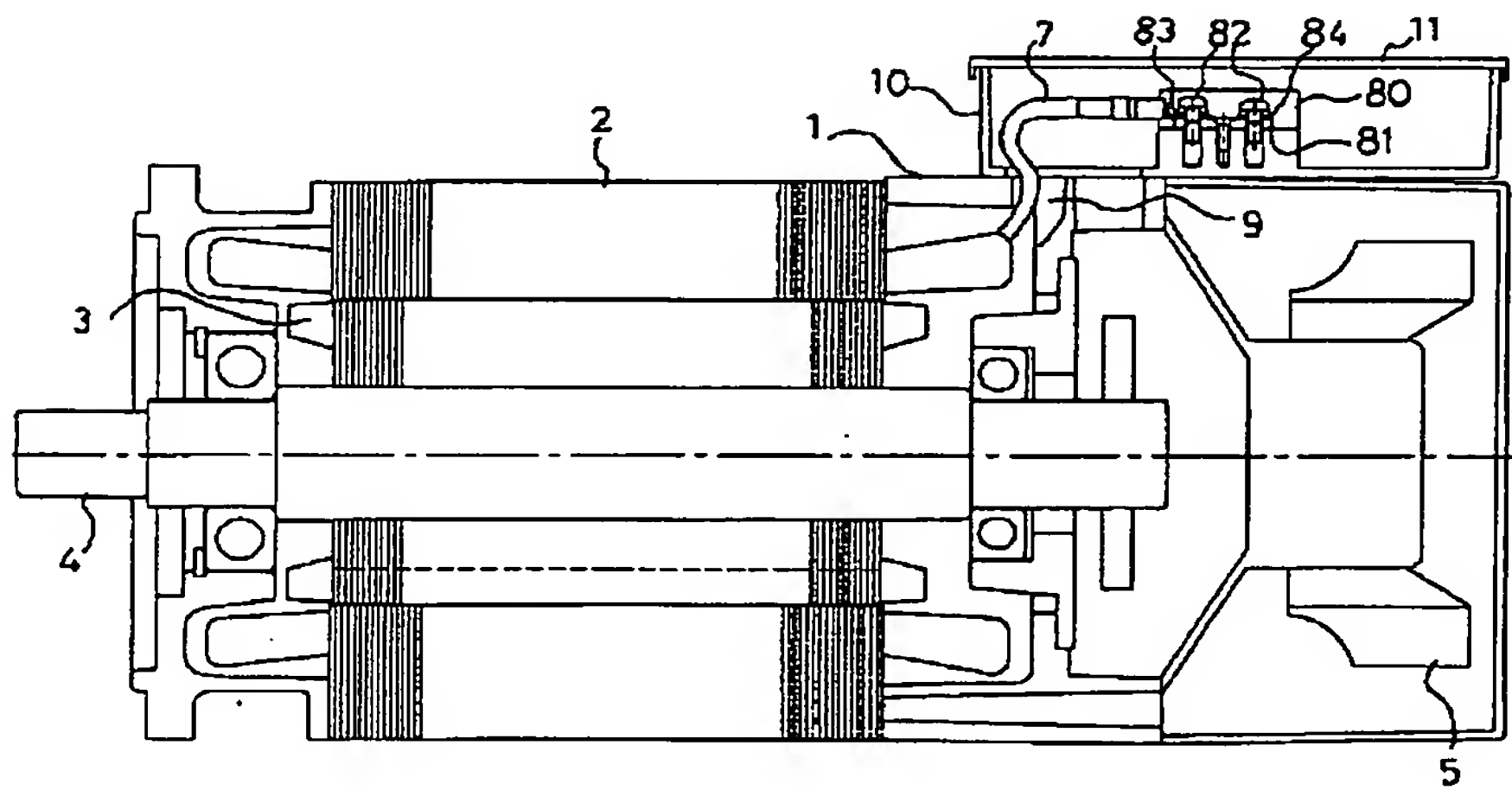
【図 11】



【図 13】



【図 12】



フロントページの続き

(72)発明者 植村 森平
山梨県南都留郡忍野村忍草字古馬場3580番
地 ファナック株式会社内

(72)発明者 吉村 一貴
山梨県南都留郡忍野村忍草字古馬場3580番
地 ファナック株式会社内
Fターム(参考) 5H604 AA05 AA10 BB01 CC01 CC05
CC16 QA08 QB01 QB03
5H605 BB05 CC06 EA14 EC01 EC04
EC07 EC12 GG06 GG12

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☒ **FADED TEXT OR DRAWING**
- ☒ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☒ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☒ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.